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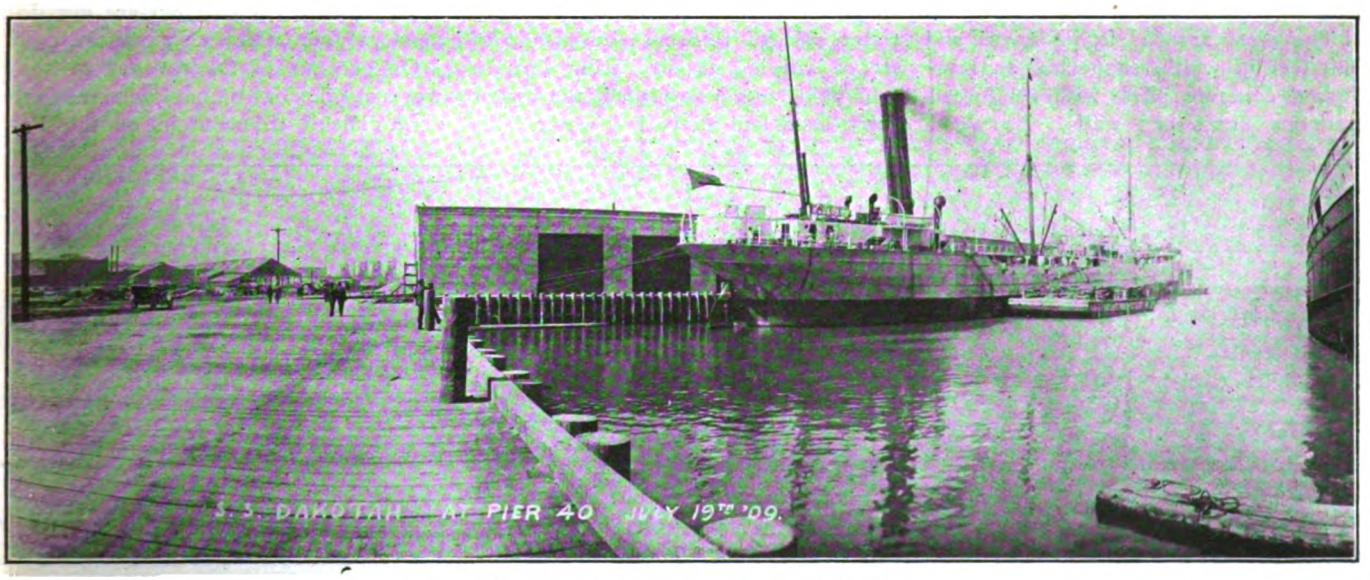
New Concrete Piers at San Francisco

IN AN article describing the harbor of San Francisco in the February issue of THE MARINE REVIEW, brief mention was made of the new steel and concrete piers under construction by the board of state harbor commissioners. The design of these piers is an embodiment of the latest modern ideas on wharf construction and their character is such that they will set the pace in dock building on the Pacific coast for some years to come. A detailed study of the construction of the new piers is well worth while.

The harbor works of San Francisco are all owned and controlled by the public through the medium of the board of state harbor commissioners. Under these circumstances it is refreshing to note that although the new piers are of a most expensive type and are among the largest on the Pacific coast, their cost is not being charged to the taxpayers of San Francisco but is being liquidated through the earnings of the piers themselves, which under the economical management of the harbor commissioners are sufficient to pay operating expenses, interest on the indebtedness and a sinking fund as well.

The Pacific coast is essentially a timber producing country. Lumber is cheap ($12 per thousand feet b. m. at Seattle for rough fir planks, caps, stringers, etc.), and consequently practically all of the wharves and docks on the western seaboard are timber construction. The adoption of designs in which no wood whatever is used, steel, concrete and glass being substituted, as a standard by the San Francisco harbor commissioners is therefore significant. Exhaustive studies have shown that even in competition with the cheap lumber of the Pacific coast, the permanent steel-concrete form of construction is more economical, operating expenses and maintenance considered. Pacific coast communities, also, have now advanced to the point where they can afford the necessarily heavy initial investments and the more permanent form of construction is only a natural consequence. The new concrete piers at San Francisco mark the beginning of



S. S. DAKOTAH AT PIER 40, JULY 19, 1909.

the end of the famous timber wharves on the western seaboard.

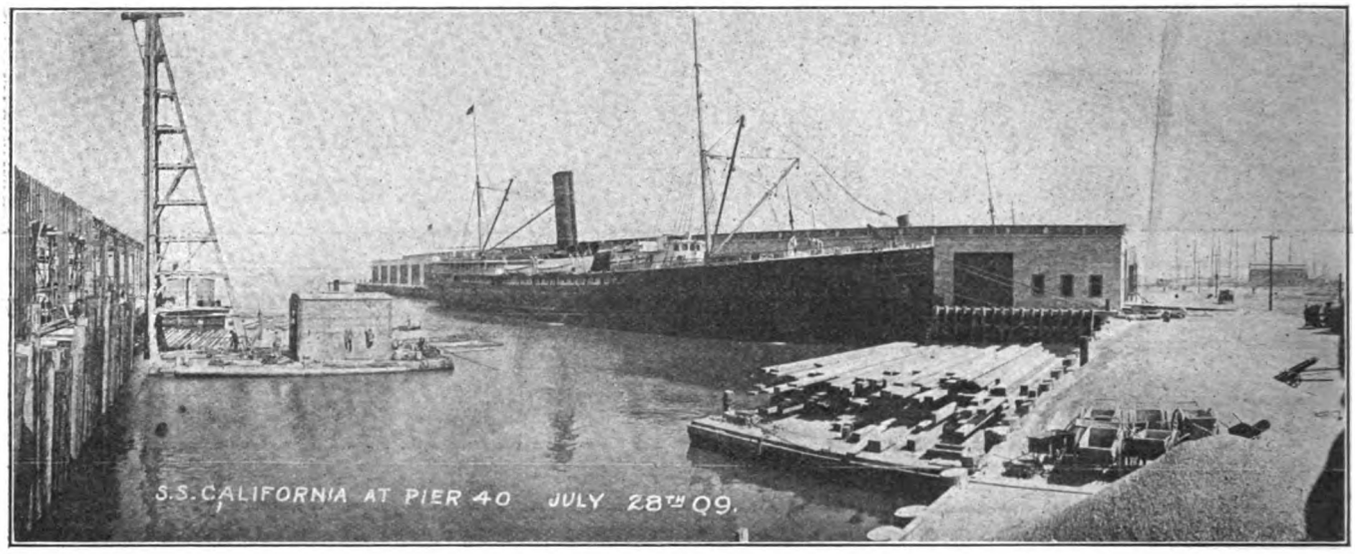
The new piers, known respectively as Nos. 38 and 40, are situated at the foot of First street, San Francisco, where there is plenty of deep water and room for maneuvering large vessels. The docks are designed for handling over-sea freight of miscellaneous character and for berthing ocean going vessels. The designed safe floor load is 500 lb. per square foot.

The piers are 650 ft. in length and 130 feet in width, supported on reinforced concrete piles, with reinforced concrete floors and walls. No wood whatever is used and the structure is absolutely fireproof. The warehouses are 108 ft. wide and 630 ft. long, leaving 11-ft. open gangways on either side and 20 ft. at the outer end.

A sea wall 1,127 ft. in length was constructed at the inner end of the piers. Work on the sea wall was commenced in June, 1907, and the wall was completed June 4, 1908. The method of building the sea wall was as follows: First a trench about 100 feet wide was dredged to hard bottom or as near thereto as practicable. Broken rock, the pieces varying in weight from five pounds to several tons, was then dumped into the trench, forming a core wall of loose rock about 60 ft. thick. On the top and water side of this core an armor of stones varying in size from one to four cubic feet was placed, the armor being hand laid above low water. This wall cost $97,249.95 or about $87 per foot of length. In the opinion of the assistant state engineer, Ralph Barker, this type wall is not satisfactory. Mr. Barker states: "Its principal fault lies in that it allows the free flow of the tide through it, which carries away the fill behind the wall, making it difficult to maintain the thoroughfare approaching the piers. It is also faulty from the fact that it is difficult to obtain a foundation which will prevent the settlement of a wall of this type." Mr. Barker recommends a type of sea wall impervious to tides, and built on a foundation which will not settle.

The piers are built out at right angles to the sea wall but are not dependent upon it for any support.

On account of the ravages of seaworms, pile or timber wharves are very difficult to maintain on the Pacific coast and the problem of properly and economically supporting the new wharves was the most serious one which the engineers had to meet. Some engineers advocated solid stone piers or piers built with a heavy stone fac-



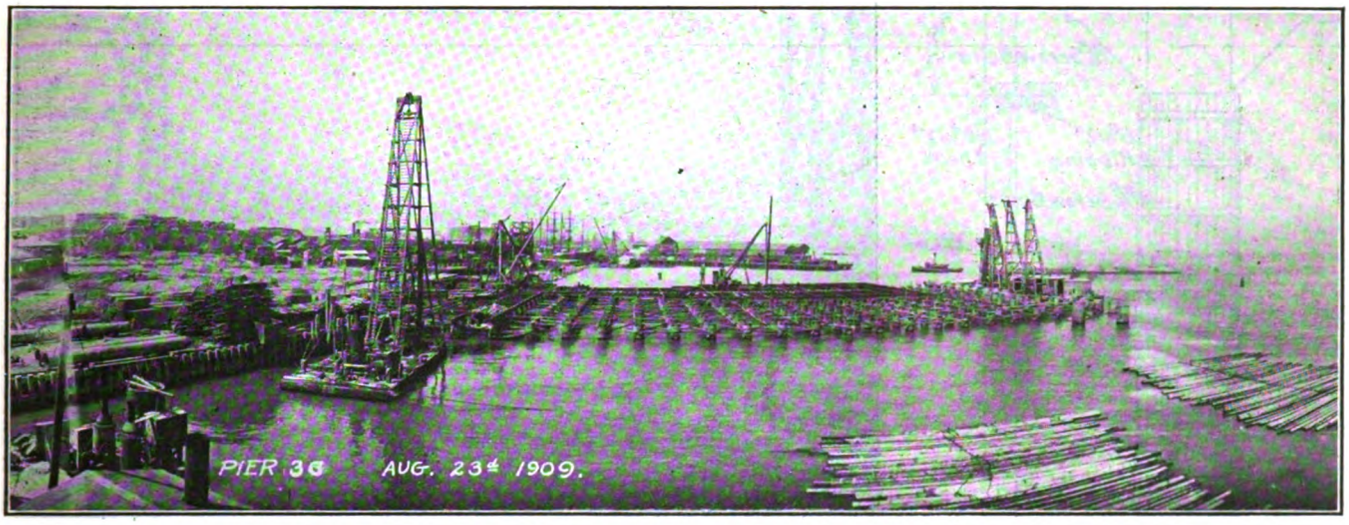
S. S. California at Pier 40, July 28, 1909.

Piers 38 and 49, July 7, 1909.

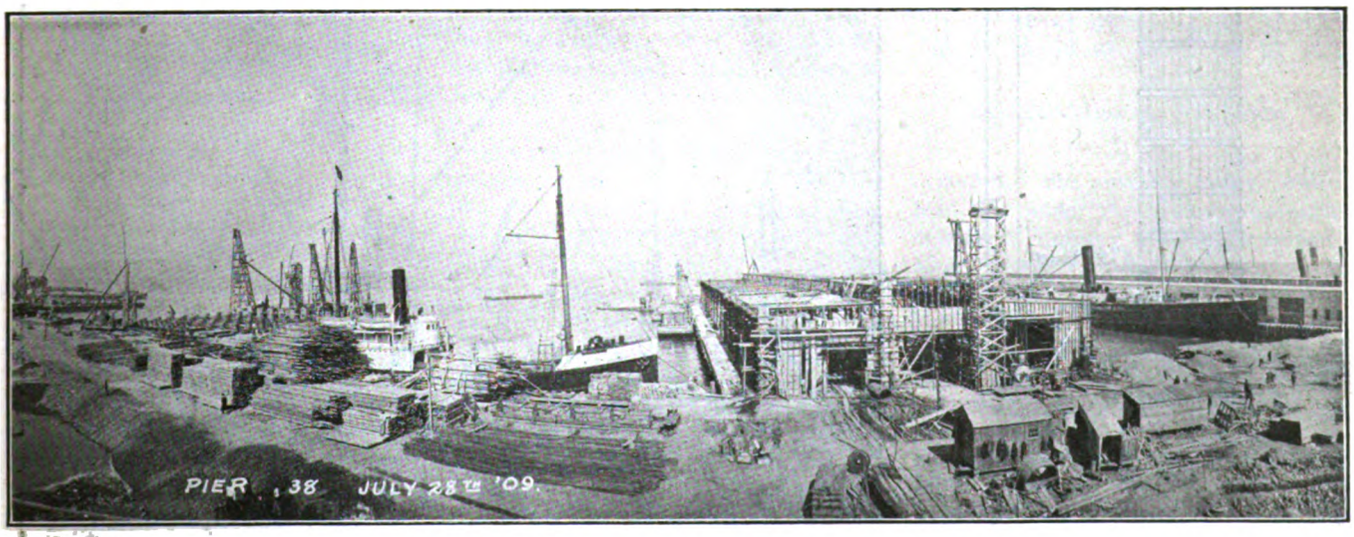
ing filled with earth. The enormous cost and the difficulty of finding sufficiently solid foundations for such structures is a strong argument against them. While such piers are permanent, it is claimed that the new San Francisco piers supported on concrete piles are equally permanent, much less expensive and easier to construct.

On account of the activity of the two species of pile worms, the limnoria terebrans above low water and the teredo navalis below low water, the life of untreated piles is confined to a few months. Under favorable circumstances a creosoted pile has a life of from 20 to 25 years. Eperience goes to show, however, that due to the many vicissitudes to which a pile is subjected, especially where exposed to collision from vessels, where careless employes find it necessary to bore holes and neglect to properly protect them and where the work of creosoting, while being good as an average is somewhat irregularly performed, the teredo has managed to reduce the theoretical 25 years of life to actual period of about 12 years.

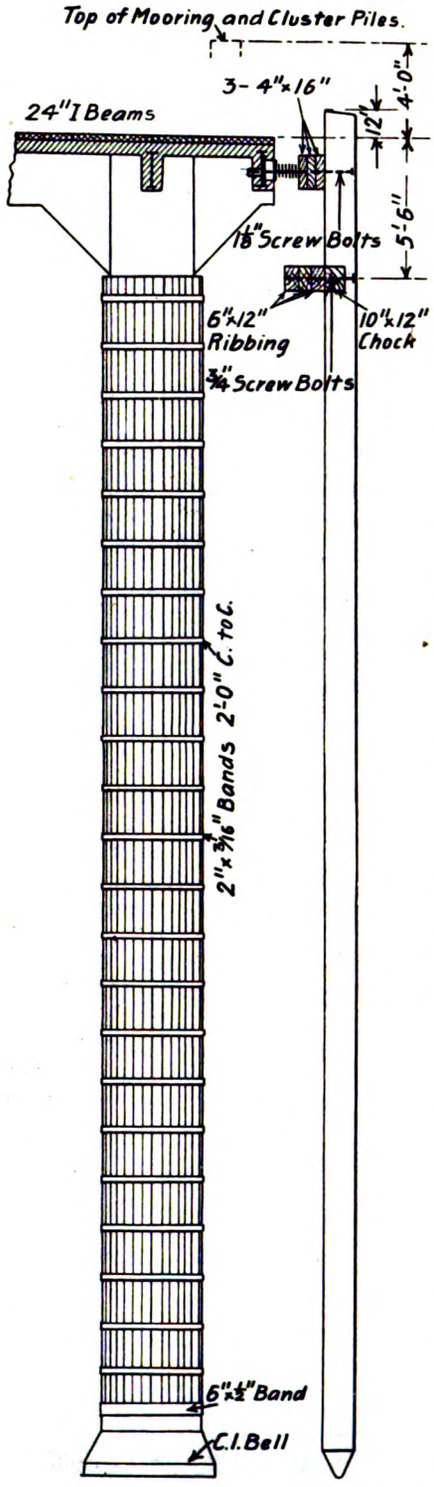
For these reasons concrete piles of two styles have been adopted at San Francisco. The older style, invented by Howard C. Holmes, consisted of a core usually of the three piles driven in a close cluster surrounded by a reinforced concrete cylinder. The new design, adopted for the piers under consideration, is a modification of Mr. Holmes, patent devised by Ralph Barker, assistant state engineer. The modification is suitable only for the conditions existing at the point where these piers are constructed. Exhaustive soundings were made at the site, and at a depth of 50 ft. below the floor of the piers there occurred a stratum of stiff clay and sand which it was very difficult to penetrate with a pile. It was decided that this soil was capable of safely supporting a load of 10,000 lb. per sq. ft. Actual test loads up to 30,000 lb. showed no settlement. The pier foundations were proportioned accordingly. The piles consist simply of a concrete cylinder reinforced with eight 1-in. square twisted bars and also a spiral wrap of ¾ x ⅛-in. flat steel, laid with a pitch of 9 in. The outside diameter of the concrete shaft is 3 ft. 6 in. The pile terminates at the bottom in a cast iron bell which gives a bearing at the foot of from 21½ to 26 sq. ft., varying diameters of bells being used. In setting the piles, a wooden form built of fir staves hooped with steel bands spaced 2 ft. on centers is sunk to the hard pan level, the cast iron bell or shoe being bolted to the bottom of this form. All the mud and water is pumped out of the form and the reinforcing and concrete is inserted. The



PIER UNDER CONSTRUCTION, SHOWING CONCRETE PILE IN PLACE.



PIER 38, JULY 28, 1909, SHOWING FORMS AND FALSEWORK IN PLACE.



SECTION OF OUTER END OF PIER, SHOWING CONCRETE PILE IN PLACE.

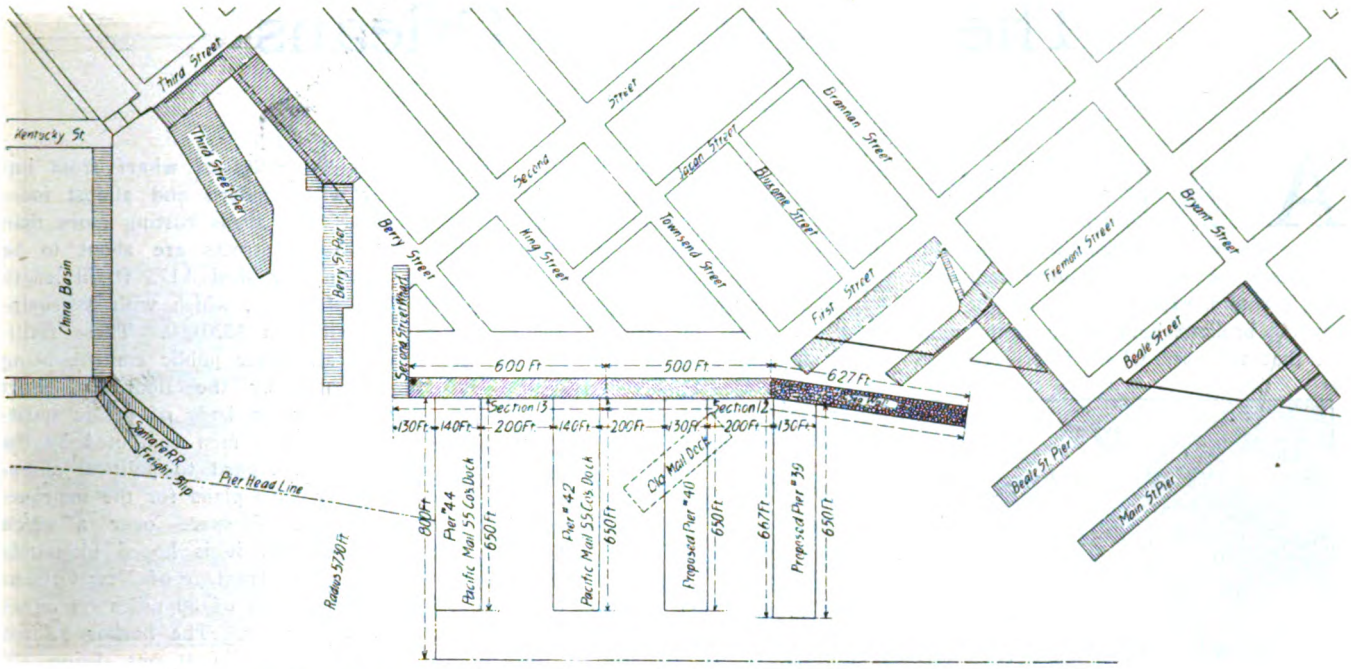
form remains on the pile, in time rotting away. In this manner a solid permanent concrete pile continuous to hard pan is obtained. The piles are spaced on 15-ft. centers lengthwise of the dock and on 13-ft. 4-in. centers across the dock, giving one pile for each 200 sq. ft. of floor. Heavy knee braces connected to the superstructure are fitted to the tops of the piles, giving lateral stiffness.

A series of I-beams is laid on the tops of the piles. Twenty-four-in. continuous 80-lb. beams are laid across the dock, on every row of piles, parallel to the shore, or 15 ft. center to center. Eighteen-in., 55-lb. I-beams, spaced 6 ft. 8 in. center to center, are laid parallel to the long axis of the dock intercostal with the 24-in. beams. These beams, thoroughly bedded in concrete for protection against the elements, carry the floor, which consists of reinforced concrete slabs, protected by an asphalt wearing surface on the sides of the pier and with a broad team-way in the center paved with vitrified paving brick. The walls are of ordinary reinforced concrete construction, the roof being carried independently by steel columns built of plate and angles or consisting of single channels. The wall reinforcement consists of 7/16-in. rods spaced 18 in. horizontally and vertically. The reinforced concrete roof is supported by steel trusses spaced 30 ft. apart.

FILLING INSHORE PILE FORMS WITH CONCRETE.

CYLINDER FORMS IN CONSTRUCTION.

Twenty rolling steel doors in each side of the warehouse and two on each end are provided. The doors are 20



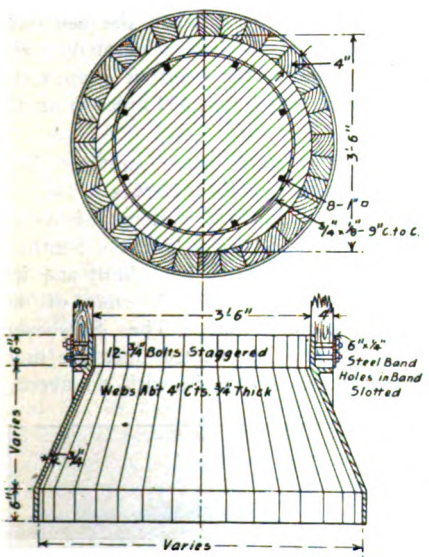
GENERAL PLAN, SHOWING LOCATION OF NEW PIERS AND NEW SECTION OF SEAWALL.

ft. wide and 18 ft. high in the clear.

At each of the outer corners a protecting dolphin consisting of about 48 60-ft. piles driven in a close cluster is placed, while the sides and end of the pier are protected by a row of fender piles spaced 3 ft. on centers.

A railway spur connecting with the belt railroad traverses the full length of each pier, the rails being supported by intercostal 24-in. 80-lb. I-beams spaced 4 ft. 10 in. apart.

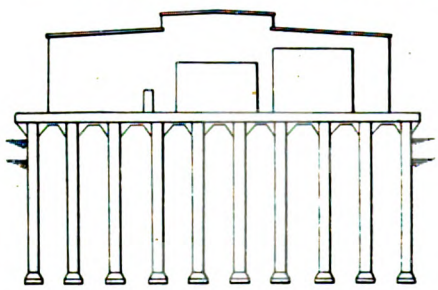
The piers are not provided with cranes or freight handling apparatus, the tackle aboard ship being depended upon for loading and unloading. The minimum depth of water alongside the docks is 25 ft.



DETAIL OF CAST IRON BELL, WHICH IS FITTED TO BOTTOM OF EACH CONCRETE PILE.

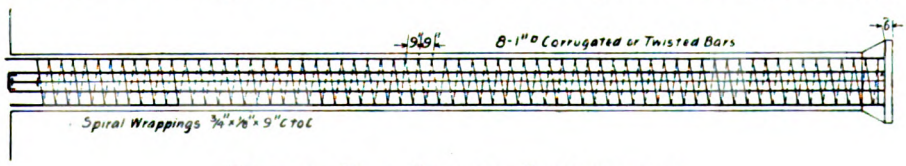
LIABILITY IN LOADING.

In the case of Taylor vs. United Fruit Co. et al., recently decided by the supreme court of Louisiana, it appeared that the defendant company had in its possession and under its control as charterer a steamship named the Bertha, employed one Legeal, who was engaged in the business of loading and unloading ships and having a number of men under him to load a cargo of crossties upon the steamship. While the latter's workmen were in the hold of the vessel to receive and properly stow the ties when received there, others upon the shore were engaged in swinging the ties therefrom on to the vessel. It appeared that when the men first went into the hold the hatch above was open, but later, by direction of one of the officers of the defendant company, the mate of the ship covered a portion of the open hatchway. The cover was improperly and insecurely placed over the hatch, so that when the ties were being lowered into the hold they struck this covering, dislodged it and caused it to fall upon the men below in the hold. The plaintiff, who was severely injured by the falling cover, sued both the company and the defendant, Legeal, to recover damages for the injury so received by him. A judgment in his favor was affirmed by the supreme court, which held that under the circumstances the defendant company was legally responsible for the injury.



END ELEVATION OF NEW PIER.

The Harlan & Hollingsworth Corporation, of Wilmington, Del., has been awarded a contract by the Central Hudson Steamboat Co., for a steamer 280 ft. long, to carry 3,100 passengers and to have a speed of 20 miles an hour. The new craft is to be launched next April and will be named B. B. O'Dell Jr.



CONCRETE PILE, SHOWING REINFORCEMENT.

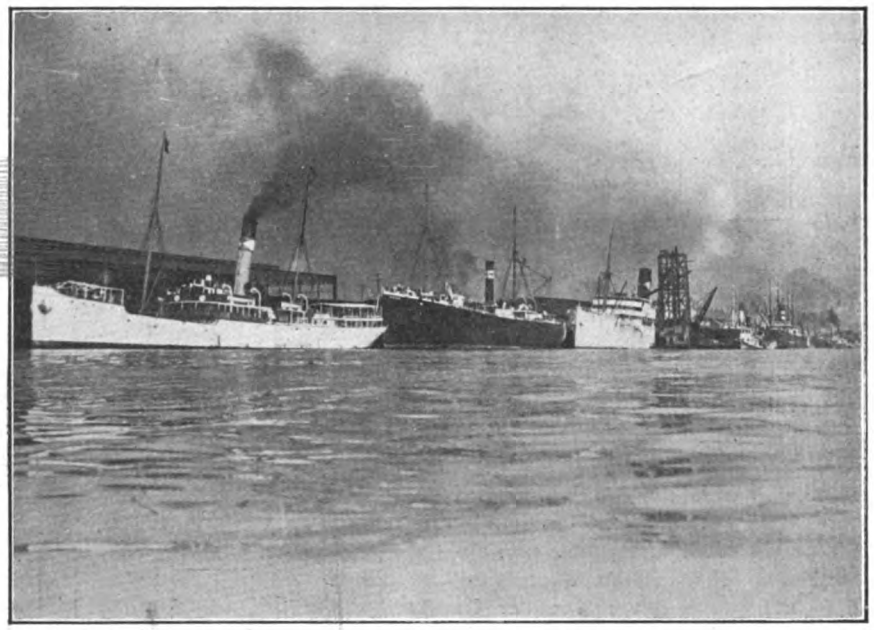
The Port of New Orleans

By E. L. Hawes.

As a port, the city of New Orleans presents some perplexing problems to the business world. This is the consensus of opinion among maritime men, planters, exporters and freight forwarding brokers, both here and throughout that territory which is tributary to this metropolis. The problems arise chiefly from two causes, steamship discriminations and the extraordinary expense of labor and handling charges. These obstacles are so great that during the past two years the state government has expended more than $40,000 in an investigation and no one has received any satisfaction from it with the exception, possibly of some labor unions.

Yet despite these drawbacks, which are openly confessed by all classes of business men, the commerce is steadily on the increase and the shippers are working with commendable courage against political pressure and gang administration towards a solution. The greatest increase has been in the coffee importations, which in ten years have grown from 300,000 bags per annum to more than 2,500,000 or a value of more than $25,000,000. The business men are not discouraged, however, as plans are now being developed for the construction of large storage warehouses which will be equipped with labor saving devices which it is stated, will reduce the handling charges about $1.05 a ton less than at present. These will also solve the problem of labor domination by the levee unions, thirteen of which have an affiliated membership of more than 13,000 and completely control the municipal political situation in critical moments.

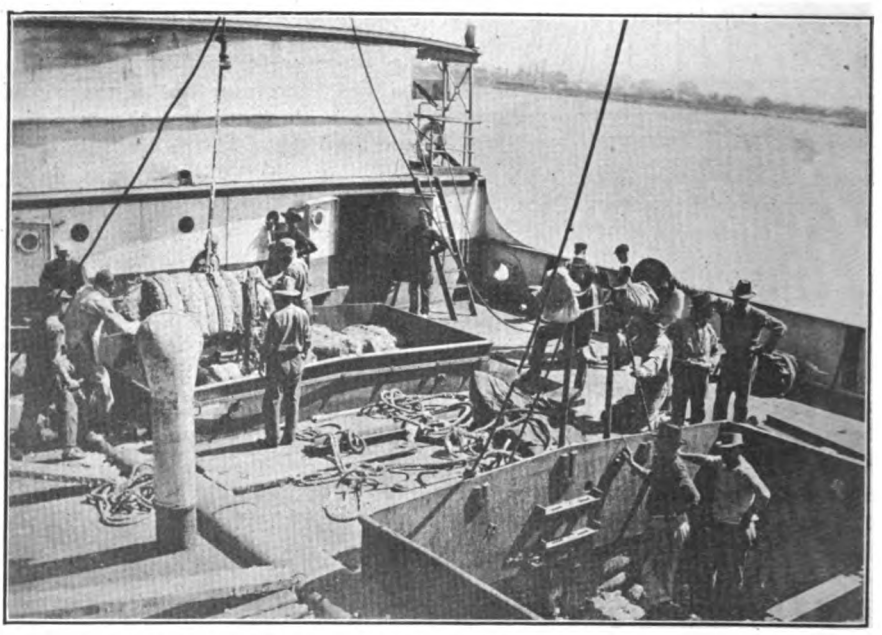
Even the most pessimistic concede that the obstacles are merely of a temporary nature and such as can be cured by aggressive action on the part of public spirited men. It is undeniable that the harbor of New Orleans is unsurpassed on the American continent. Already there is 4½ miles of wharf front improved with modern and almost indestructible steel sheds costing more than $2,500,000. Contracts are about to be let for another shed 3,176 ft. in length and 200 ft. wide, which with its equipments, will cost $320,000. These facilities are all under public control, being administrated by the Board of Port Commissioners, a body of public spirited and energetic men appointed by the state without regard to political affiliation. They have plans for the improvement of wharf space over a much larger area and it is hoped ultimately that the wharf frontage of New Orleans will be in excess of 30 miles on either side of the river. The harbor affords a safe roadstead in storms, being 110 miles from the open sea and of an average width of ½ mile and depth of 250 ft. in the channel.



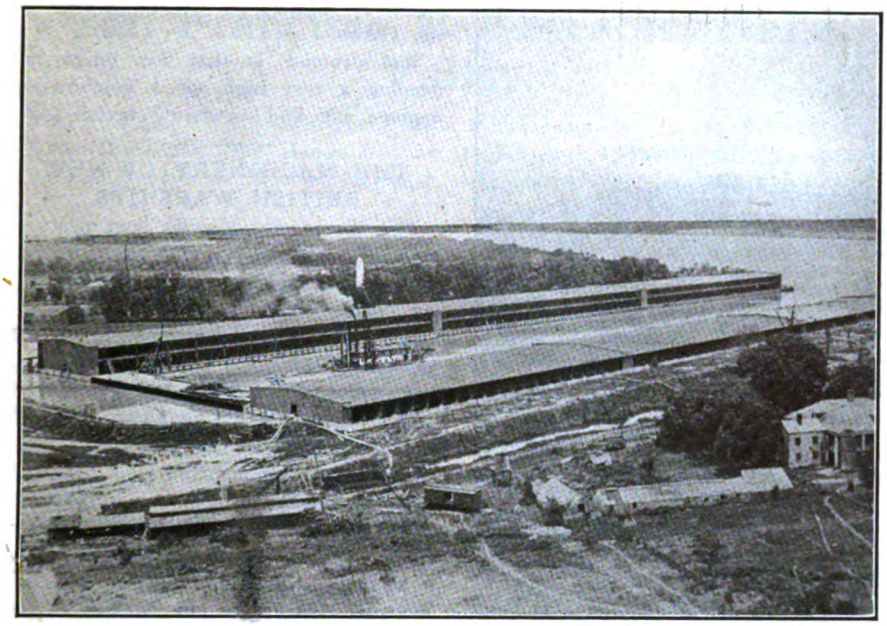
The Illinois Central Fruit Wharf, Showing Central American Fruit Vessels Unloading Cargoes by Machinery.

In fact, a battleship can come up to the wharf and be tied up as the average depth at the berths is about 30 ft. This was done last year, when the battleship Mississippi made her celebrated cruise up to Natchez, the head of deep water navigation, more than 400 miles from the mouth.

And not alone have millions been spent on the public wharves. Two of the greatest railroad systems of America, the Illinois Central and the Southern and Frisco railroads, have built and improved wharves at both ends of the public water front. The Stuyvesant docks of the first named lines are more than a mile in length, with an average



Stowing Cotton by Hand in One of the Large British Cotton Carriers.



THE MARINE TERMINALS OF THE FRISCO-SOUTHERN RAILWAY AT CHALMETTE SLIPS.

width of 200 feet. Two huge grain elevators, equipped with the most approved drying and handling facilities are situated in proximity with the wharves and the cars can be unloaded directly into the warehouses. The warehouse has storage capacity for 400,000 tons or fifty cargoes of 8,000 tons. These berths are also served by the Public Belt railroad, a municipal switching facility which serves every industry and wharf both public and private in the port. The Stuyvesant docks with their storage yards, whose capacity is more than 5,000 cars, cost more than $4,000,000.

At the other end of the port which covers three parishes, Orleans, Jefferson and St. Bernard, is the magnificent set of marine terminals of the New Orleans Terminal Co., a corporation owned jointly in equal part by the Southern Railway and the Frisco systems. This cost $11,000,000 and contained the only slip in the port. Along either side of the slip, which has an average depth of 45 ft. and is 1,800 ft. long, are the storage and unloading warehouses. These are of steel construction and will have when finished two stories, the lower for the outbound cargo and the upper for the inbound. The slips will accommodate berths for more than 12 vessels of 400 ft. keel each, which can lie with equal safety inside and outside of the slip. The terminals are served by the Public Belt and the New Orleans Terminal belt which has interchange facilities with all lines.

New Orleans has steamship lines to all the larger ports of the United Kingdom, Germany, France, Spain, Italy, Denmark, Holland, Sweden, Austria, Portugal, Russia, Greece, Central America, Mexico, Cuba, Porto Rico, Panama, Brazil and the Argentine, many of which have regular liners. The largest tonnage goes to the United Kingdom, France, Central America and Germany, although the Adriatic ports are served by monthly sailings. The tonnage of vessels last year was 4,748,104, of which 3,935,538 went to the public wharves. The value of the imports last year was in excess of $40,000,000 and the exports many times that amount. The port is now the leader in imports of bananas, cocoanuts and sisal grass and holds third place in exports of cotton. The port charges amount to 2 cents a day per ton for the first three days and 1 cent for the next six days, making a maximum charge of 9 cents a ton for 36 days wharfage. The average charge last year was 7 cents a ton.

THIRTY-FIVE THOUSAND BAGS OF COFFEE ON THE WHARF AT NEW ORLEANS, PART OF THE LARGEST COFFEE CARGO EVER RECEIVED IN NEW ORLEANS.

CHESAPEAKE STEAMSHIP CO.'S NEW STEAMERS.

The Chesapeake Steamship Co. awarded contract to the Maryland Steel Co., Sparrows Point, Md., for the construction of their two new steamers, to be called the City of Baltimore and the City of Norfolk. These two steamers will unquestionably be the most modern and up-to-date steamers on the Chesapeake bay.

They will be 310 ft. long over all, beam molded at deck 46 ft., beam molded at water line 42 ft., beam molded over guards 60 ft., and they will contain 147 staterooms, 12 of which will connect with baths, which will have hot and cold fresh and salt water, and ten rooms with hot and cold fresh and salt water shower baths. This is a new feature and one that will no doubt prove attractive to the traveling public.

The dining-room, which will be on the hurricane deck forward, will have a seating capacity of 60 persons. The kitchen and pantry will be next to the dining-room so that the service will be prompt and first class in every particular. The balance of this dock will be devoted to staterooms, except aft, where there will be a new feature in the shape of a lounging-room for ladies and gentlemen. Next to this will be the wireless telegraphy room. The main saloon deck will be

BUSY SCENE ON THE LEVEE DURING THE COTTON SEASON, SHOWING THE STEEL SHEDS OF THE HARRISON LINE.

devoted entirely to staterooms, while the main deck will be for freight, except aft, where there will be a commodious smoking-room, with bar adjoining.

The machinery will consist of a 4-cylinder, triple-expansion, surface condensing engine, and will have cylinders 24½-in., 40, 47 and 47-in. diameter by 42-in. stroke. These steamers will also be equipped with their own refrigerating plant, thus affording cold storage facilities for taking care of dairy products, as well as refrigerating all supplies for their own use.

Special attention has been given in drawing plans and specifications to every facility for a prompt and careful handling of all freight cargo. The steamers will carry 650 tons of high class merchandise freight.

COMBINATION ENGINES.

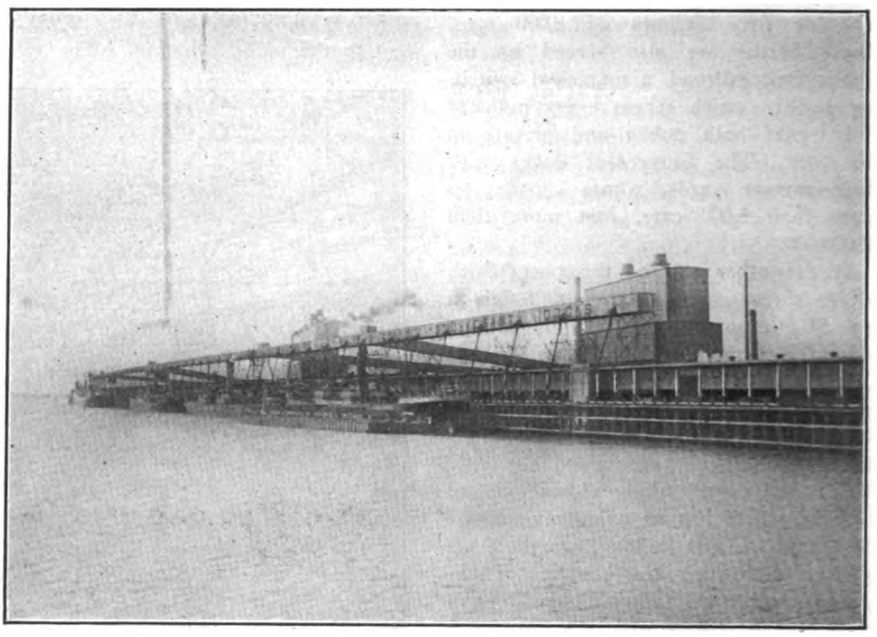
Having passed beyond the experimental stage, the employment of combination engines for long voyage passenger liners continues to make headway. Curiously enough, it is in vessels engaged in trading between England and Australasia that the adoption of this type of engines is most in evidence. The latest Orient liner to be built on the Clyde will have duplicate sets of reciprocating engines for her wing propellers, with a low-pressure turbine for her midships screw. In this respect she will be similar to the 12,000-ton liner Demosthenes, which the Aberdeen-White Star Line will place in their London-Australian service about April of next year.

The New Zealand Shipping Co. has the credit of being pioneers in this respect, so far as the Australian and New Zealand trade is concerned. About a year ago, their cargo vessel Otaki, which has combination engines, made her maiden voyage to New Zealand ports. Built as she was on similar lines to one of the company's full-powered steamers possessing the ordinary type of reciprocating engines, the owners were able very accurately to draw comparisons between the performances of the two types. That the New Zealand Shipping Co. is satisfied as to the advantages of combination engines is proved by the fact that their latest passenger steamer, the Rotorua, is engined on the same lines as the Otaki.

The promise is that for liners not needing a very high speed, combination engines will find increasing favor.

THE MACHINERY OF NEW BRITISH WARSHIPS.

The six special torpedo boat destroyers just ordered by the British Admiralty will prove exceedingly interesting craft from an engineering point of view, and their sea performances will be awaited with deep interest. The two vessels entrusted to the Parsons Marine Steam Turbine Co., the hulls of which will be constructed by Messrs. William Denny Bros., Dumbarton, it is reported, will be propelled by Parsons geared turbines; the two to be built by Messrs. Yarrow & Co., Scotstown, will be fitted with Brown-Curtis turbines, and the remaining two, given to Messrs. J. I. Thornycroft & Co., Southampton, will be propelled by Parsons turbines driving twin screws. The contracting firms are given a perfectly free hand in the design and construction of the propelling machinery, and as a result of this calling to their aid the technical skill and experience of these famous torpedo craft constructors, it is not unlikely that the Admiralty will succeed in improving the efficiency of the destroyer.



STUYVESANT DOCKS, THE PRIVATE MARINE TERMINALS OF THE ILLINOIS CENTRAL SYSTEM, SIX MILES ABOVE THE CITY FRONT.

The T. S. Marvel Shipbuilding Co., Newburgh, N. Y., has been awarded the contract for the hull and carpenter work of the new sidewheel steamer for the Catskill Evening Line, which will be 285 ft. long over all, 66 ft. beam over guards, and 12½ ft. deep.

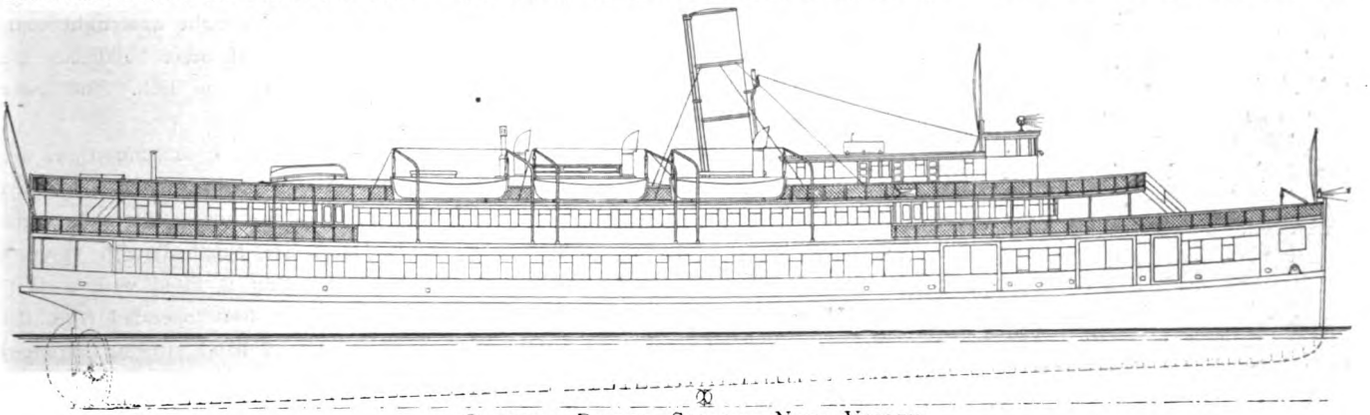
San Francisco Bay Steamer Napa Valley

NAPA VALLEY, recently completed by the Union Iron Works Co., of San Francisco, for the Monticello Steamship Co., for passenger and excursion traffic on San Francisco Bay between the cities Vallejo and San Francisco, is one of the finest vessels of its kind built on the Pacific coast in 1910. She is a single screw steamer with an over all length of 240 ft., between perpendiculars 230 ft., beam at waterline, 38 ft.; over guards, 49 ft.; molded depth, 16 ft.; and draught, 9 ft. 6 in.

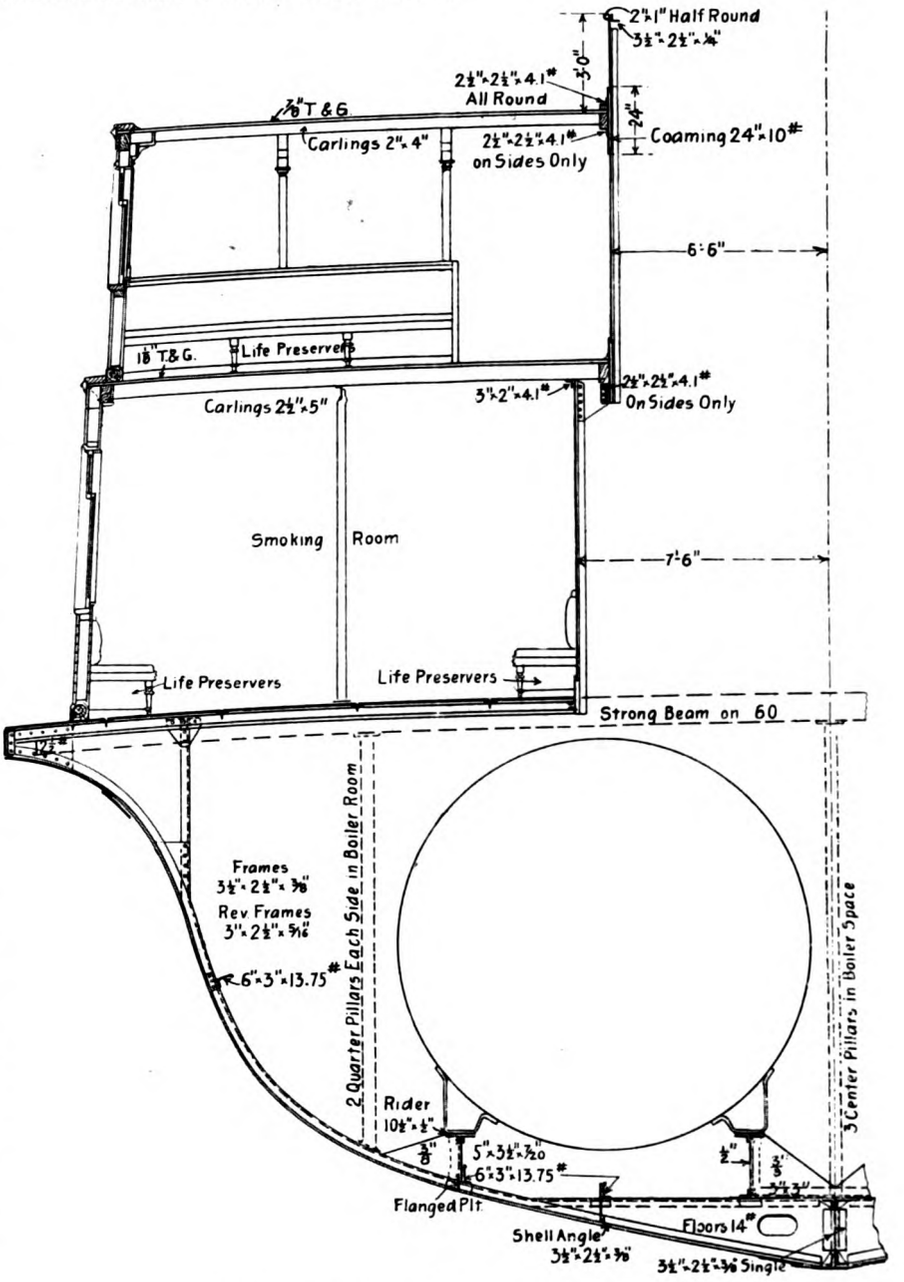
There are four decks; lower, main, saloon and texas, respectively. On the texas deck are the pilot house, rooms for officers, reception rooms, six life boats, four life rafts, saloon skylight and seats for passengers. The saloon deck is continuous, open at the forward end and has a length of 152 ft., with a breadth of 41 ft., with seating capacity for 800 persons. The seats are grouped forward and aft with a double row on each side, surrounding the engine and boiler room hatches and passages. Abaft this saloon are the toilets and retiring rooms for women. Outside in the open spaces at either end of the saloon deck slat seats are fitted.

The forward portion of the main deck is arranged to accommodate general cargo and bulky material, as vehicles, with two large gangways on either side. The deck in way of the cargo space is sheathed with wood, the remainder being covered with linoleum, except in the galley, pantry, and toilet rooms, which are cemented. Aft of the cargo space is the smoking room with a wide stairway leading down to the buffet and barber shop on the lower deck directly below the cargo space. Leading aft from the smoking room a wide passage way opens into the galley, pantry, mess room, store room, refrigerator, men's lavatory and accommodations for engineer and assistant engineer, steward and purser. A stairway leads up to the saloon and another to the engine room on the lower deck. At the after end of the main deck is located the dining saloon, with a serving table in the center around which are grouped 18 tables with seating capacity for 84 persons. The extreme aft end of the main deck is open.

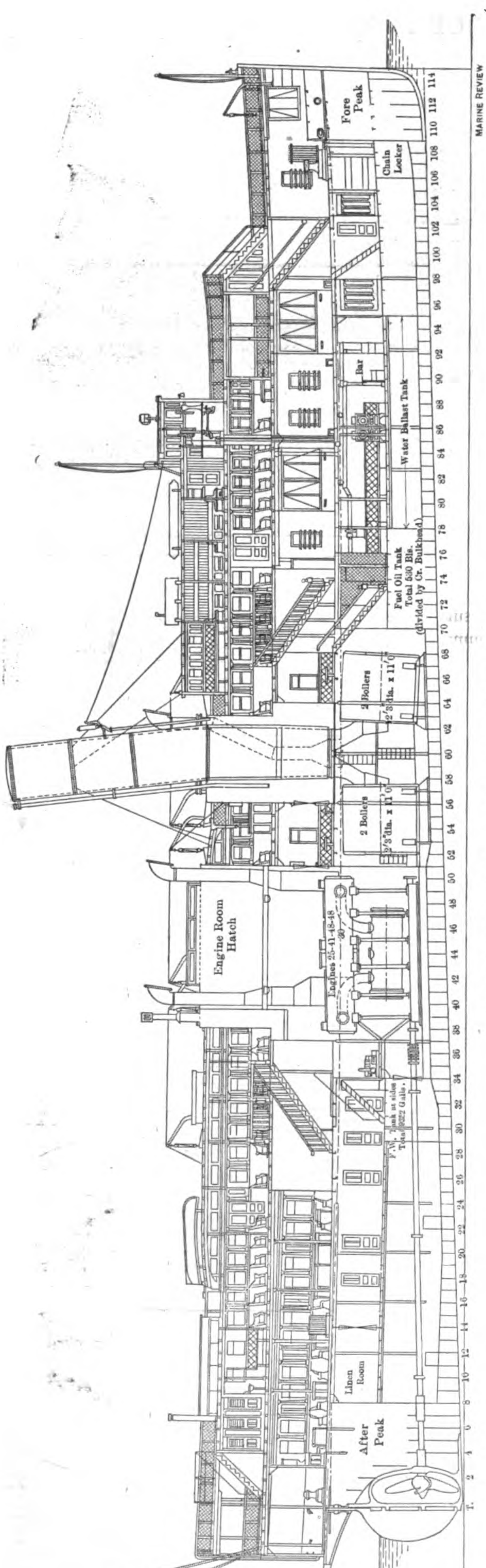
Forward of the buffet on the lower deck are lockers and quarters for six firemen and 12 seamen. Aft of the engine room are the quarters for the



OUTBOARD PROFILE, STEAMER NAPA VALLEY.



MIDSHIP SECTION, STEAMER NAPA VALLEY.



LONGITUDINAL SECTION, STEAMER NAPA VALLEY.

cooks, waiters, porters, oilers, watchmen, and space for stores.

The hull is constructed of best mild steel throughout with upper works of wood and with steel divisional bulkheads and casings. Seven steel bulkheads divide the hull into eight watertight compartments. Six of these bulkheads are carried up to the main deck. The lower decks are of steel.

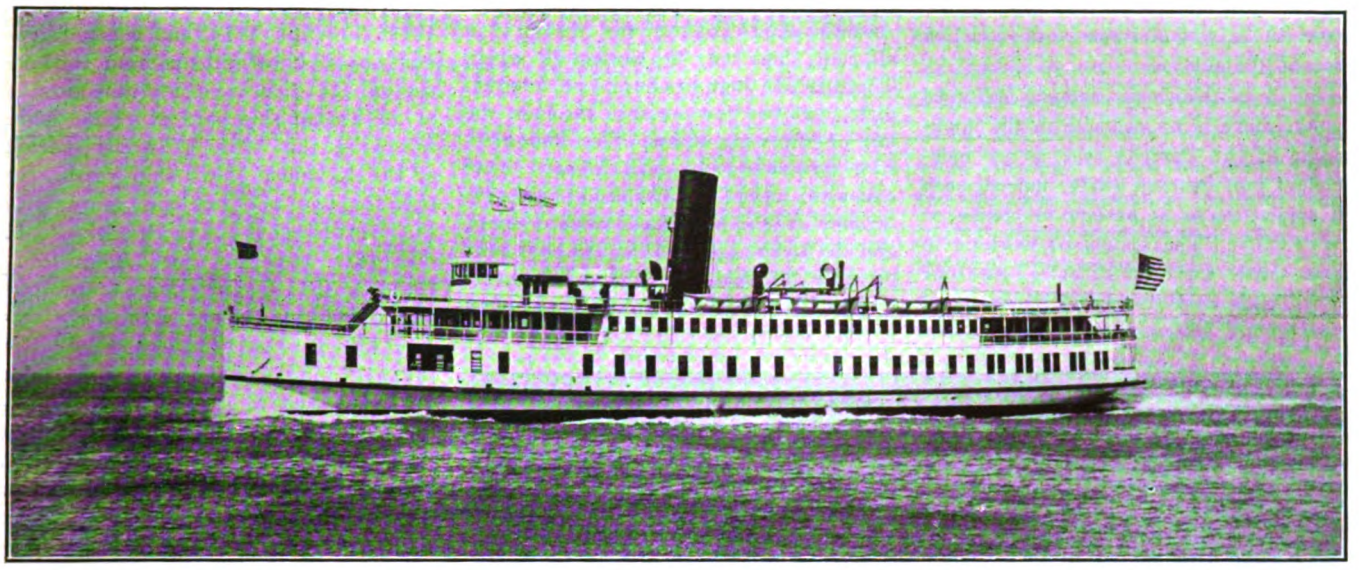
Fifteen 2-in. fire hose connections are distributed over the vessel, each equipped with 50 ft. of fire hose. All wash basins and closets are supplied with running water. The ship is fitted with a Williamson steerer shaft, operated from the pilot house, and hand steering arrangements are fitted in the pilot house and to the hand capstan aft on the main deck.

The hull is built substantially throughout and the leading particulars are shown in the midship section. The stern frame is forged 7 x 4 in., with a 6 x 3½-in. rudder post. The rudder frame is forged from best scrap iron with stock 6 in. in diameter and three 2⅞-in. pintles. Frames are spaced 24 in. centers and extend from keel to guard in one length, excepting where they are cut out and bracketed to accommodate the fuel tanks. Reverse frames extend from the keel to the main deck in one piece on alternate frames and to the top of the side stringer on the others and are doubled across the engine room floors.

Main deck beams are of 5 x 2½-in. x 10.5-lb. angle bulb on alternate frames, with main deck stringer plate 36 in. x 12½ lb. and 10-lb. plating carried flush with bar seam straps.

The guard is formed of 10x3½x½-in. channel bars carried entirely around the main deck and riveted to the deck stringers and to the shell plating, and bracketed to the frames and main deck beams.

The propelling machinery consists of a four-cylinder, triple-expansion engine, with cylinders 25-41-48 and 48-in. diameter, 30-in. stroke, driving a four-bladed bronze propeller 11 ft. 10 in. diameter, 14-ft. pitch, and supplied with steam by four Scotch boilers, using oil fuel. The engine framing consists of cast iron box type rear columns, carrying slipper guides, which are arranged for water circulation; the front columns are of forged steel, finished. The bed plate is of box section in two parts, with main



STEAMER NAPA VALLEY, OF THE MONTICELLO STEAMSHIP CO.'S FLEET.

bearings lined with white metal. The main bearing binder bolts are fitted with graduated nuts.

Balanced slide valves are used on the low pressure cylinders and the high pressure and intermediate cylinders are fitted with piston valves working in cast iron liners. The valve gear is of the usual double-bar link type. Piston rods are of nickel steel, 5⅛ in. diameter and are interchangeable and fitted with Watson metallic packing. Connecting rods are of the forked type, 75-in. centers, the top end fitted with bronze boxes and the lower end with steel boxes lined with white metal. Cross-head pins are 7½ x 6½ in. The crank shaft is solid forged, 11½ in. in diameter, and made in two sections, with the cranks in each section placed at 180 degrees; the line shaft is 11 in. diameter and the propeller shaft 11¾ in. diameter. The propeller is sectional with cast iron hub and cone and bronze blades. The stern tube is of the usual type, of cast iron, with composition liners fitted with lignum vitae staves. The reversing engine is of the ordinary direct steam type, with floating valve gear. A two-cylinder, 4 x 4-in. turning engine and ratchet hand gear are also fitted.

The four single-ended boilers are set in two batteries facing each other fore and aft, with fire room between. Oil fuel is used exclusively. The boilers are 12 ft. 3 in. diameter, 11 ft. long between heads and contain three 34-in., removable, suspension type furnaces with common combustion chambers. There are 322 2½-in. tubes, 7 ft. 6 in. long, and every fourth tube in both vertical and horizontal rows is a stay tube. The heating surface in each boiler is 1,970 sq. ft. The boilers are designed for a working pressure of 180 lbs.

A fuel oil tank with a capacity of 26,500 gal. is fitted directly forward of the boiler room.

The surface condenser is independent and the cooling surface 4,250 sq. ft. The circulating pump is of the centrifugal type, with a capacity of 4,000 gal. per minute. The air pump is of the Blake vertical simplex type, 14 x 24 x 18 in. Independent feed, fire, sanitary and fresh water pumps are also fitted.

One 7-K. W. and one 20-K. W. G-E turbo-generators supply current for about 325 incandescent lamps and one standard search light. The usual call bells, speaking tubes and telegraphs are fitted throughout. Altogether the Napa Valley is one of the best examples of a passenger steamer on the Pacific coast, and it is claimed that on her trial trip she attained a speed of 20½ statute miles per hour.

FACTORS CONTRIBUTING TO SPEED IN SHIPS.

There is a chapter in Brassey's *Naval Annual* on engineering problems, and Alex. Richardson, who contributes it this year again, has been able, in a complete thesis on the "Efficiency of the Factors Contributing to Speed in Ships," to afford information regarding the development of the moment. He pleads for a fuller measure of efficiency in speed, contending that engineers are now beginning to realize more fully that what must be aimed at is not the best results of the boiler, engines, or propeller separately, but the efficiency of the whole combination, taking into account the proportions of the hull for a given displacement, the lines of the ship, the quality of the coal, the evaporation of the boiler, provision against heat radiation from the pipe connections, the thermo-dynamic efficiency of the turbines and the auxiliaries, the value of high vacua, and the efficiency of the propeller.

He shows that the steady development in the length of battleships and cruisers has conduced to higher speed. A careful estimate of the probable effective power required for overcoming the resistances in a 27-knot ship shows that, in a vessel of 530 ft. long between perpendiculars, and of 17,250 tons displacement (like the Invincibles), the power required to overcome skin-friction resistance is equal to about 0.84, and that to meet residuary resistance to about 0.85 effective horsepower per ton displacement; whereas in the latest British cruisers of 660 ft. long between perpendiculars and 26,350 tons displacement—these figures may be 0.75 and 0.68 respectively per ton displacement, a saving of about 15 per cent in the total effective horsepower per ton displacement. As confirmation of this, it is stated that had the Lusitania and Mauretania been 700 ft. long instead of 785 ft., the power necessary to attain their speed would have been at least 10 per cent greater.

Data are given regarding trials of the Parsons partial-admission turbines, wherein it is shown, by comparison with an ordinary high-pressure cruising turbine, that the increase in the total power of a ship for the same quantity of steam is about 7 per cent. This is sure to be improved upon with experience. But perhaps of greater interest is the practice of fitting an impulse first-stage wheel in combination with reaction blading in turbines, as there is a great possibility of increased economy, especially at low powers, by such a combination, while at the same time greater simplicity and strength in manufacture is achieved than with compound-impulse turbines as fitted to each shaft in some European ships. For the lower powers

the steam would pass from the impulse stage to the second stage in the reaction part of the turbine.

One point which is strongly enforced is that there is no obstacle to the application of the Parsons type as an independent unit on each shaft; indeed, such an application is at present in course of construction. The system of working in series with Parsons turbines on four shafts lends itself to high economy; and it is pointed out that in the new Spanish ships, as well as in the French trans-Atlantic liner France, the turbines in all four ships may be worked in series. There is one high-pressure, one intermediate, and two low-pressure turbines, the last on the wing shafts. The high-pressure turbine on the port inboard shaft exhausts into the intermediate-pressure turbine on the starboard inboard shaft, and the steam passes thence to both low-pressure turbines. It will be interesting to note the effect on steam consumption of this arrangement.

ROBERT H. LAVERIE.

Mr. Robert H. Laverie

ROBERT H. Laverie has been appointed to the office of chief surveyor of Bureau Veritas for the United States to succeed the late Henri Wilkinson. This appointment will be well regarded throughout the whole ship building and engineering industry, as Mr. Laverie's experience has been of an international character. He was born in Glasgow and began his training 21 years ago in B. & W. Henderson's yard in that city, following which he concluded a five years' course of training with G. T. Davie & Sons, Quebec, Canada, under his father, who had been superintendent at that plant for 24 years. After leaving Quebec Mr. Laverie spent a year and a quarter with the American Steel Barge Co. at West Superior, Wis., and became generally well known throughout the lake region. He then went for nine months to the Cramp ship yard at Philadelphia, following this with a similar period at the Newport News ship yard. He was for two and one-half years with the Herreshoff Co., at Bristol, R. I., one year with the Fore River Ship Building Co., Quincy, Mass., and one and one-quarter years with the Crescent ship yard at Elizabeth, N. J. For the past nine years he has been with the Townsend & Downey Ship Building Co., now the Shooter Island Ship Yard Co., at Mariner Harbor, N. Y. During his career at Shooter Island, a large number of vessels of all types were constructed under his superintendence, including the large tank vessels for the Standard Oil Co., several vessels for the United States government service, and among the cup winning yachts the famous Meteor for the Emperor of Germany, and the Atlantic, Elmina, Thistle and Neola.

Mr. Laverie is a member of the Society of Naval Architects and Marine Engineers, and of the Maritime Association of the Port of New York. He is one of the directors of the Mariner Harbor National Bank, and vice president of the Mariner Harbor Building & Loan Association. He is also a member of the Canadian Society of New York.

A NEW GOVERNMENT STEAMER.

The contract for the building of the United States steamer Woodbine has been awarded to the Waters-Colver Co., West New Brighton, Staten Island. The Woodbine will be a single screw, wooden steamer, to be used by the United States government, as a lighthouse tender; length over all 91 ft. 1 in., length on water line 86 ft., beam molded 16 ft., depth of hold 7 ft. 2¾ in., and a draught of 4 ft. 5 in. The Woodbine will be about 62 tons displacement and will be equipped with an Almy water tube boiler, 200 lb. pressure, a triple-expansion engine with cylinders, 8 x 13 x 21 x 16 in., swinging a wheel 4 ft. 7 in. diameter. She is designed for harbor and river work by the department of commerce and labor and will be built by the Waters-Colver Co., in a thoroughly first-class manner. The construction of the hull of the Woodbine is now under way and will follow the two new city steamers, Riker's Island and Hart's Island, which are being constructed at the same ship yards.

Marine Suction Gas Producer Engines On the River Rhine

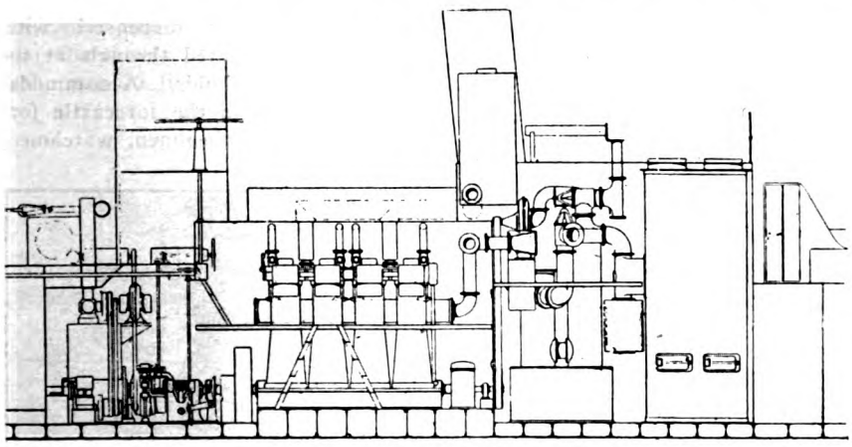
THE Otto Gas Engine Works in Germany first tried a producer gas engine for boat propulsion in 1901, and a number of canal boats with engines as large as 45 actual horsepower were sold by the German factory. On account of the considerable space occupied by the producer plants as then built, the business grew very slowly. Gasoline and kerosene engines almost monopolized the field. The successful operation of the marine producer gas engines on canal boats, however, indicated possibilities in the use of such plants on larger tow boats or tugs. Many attempts were, however, unsuccessful because they failed to realize the peculiar requirements of marine service.

With the further development of producers, it became possible to utilize brown coal briquettes as well as anthracite in those of the double-fire type, and as these briquettes can be obtained cheaply anywhere on the Rhine, the economical operation of larger boats with producer equipment became possible.

After making a careful estimate of the cost and condition of operation, the Otto Works found that the brown coal producer plant had a decided commercial superiority over steam, and the company decided to construct such a boat and the tug Deutz was equipped with a 500-i. h. p. gas engine plant in place of a 300-i. h. p. steam plant, requiring a lengthening of about 10 ft. The present dimensions and draught with 30 tons of briquettes on board, are: Over all length, 112 ft.; greatest width, 20 ft.; draught forward, 5½ ft.; draught aft, 6 ft.

The stack was retained to provide free outlet for the exhaust.

The whole machinery layout, as shown in the plan herewith, occupies a space 20 x 42 ft. The producer room is separated from the engine room by a bulkhead provided with a sliding door. The height of the producer room is 14½ ft. This room contains producer, gas cleaning apparatus, and the coal bunkers.



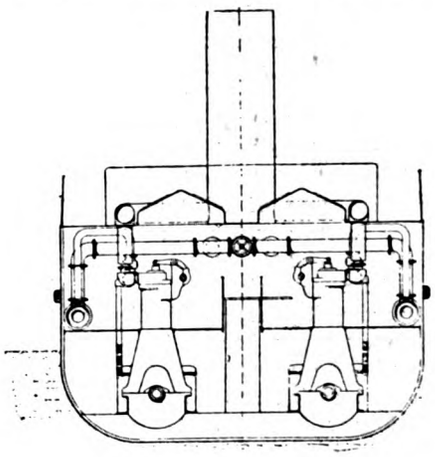
ARRANGEMENT OF GAS PLANT IN TUG DEUTZ.

The producer is of the double-fire type, in which all the volatile matter in the fuel must pass through the upper fire zone before it reaches the gas outlet, making the gas practically tar free.

The cleaning apparatus consists of two separate units, capable of independent operation. After passing through a small scrubber with a spray at the top, the gas enters the main scrubber, which is provided with eight spray heads, one above the other, and each removable while running. From the main scrubber the gas passes to a centrifugal washer, driven from the main shaft, and provided with suitable water sprays. The gas next passes through a water separator. The two scrubber units have a single pipe leading to the gas receiver and thence to the engine.

There are two four-cylinder, 250-h. p. engines, each driving a 5-ft. propeller through a reverse gear. The engine speed can be controlled between the limits of 90 r. p. m. to 200 r. p. m. from the engine platform. While maneuvering and picking up tows, one engineer and a helper operate the machinery. The helper also relieves the engineer during part of the long 16 to 18-hour day.

The gas engine and reverse gear are



said to be so well adapted to maneuvering, that the operation is even quicker and more certain than with a steam engine.

In the engine room are two pumps, one for delivering water to the jackets and scrubber, and another for pumping waste water from a well under the scrubber.

On the after port side of the engine room is placed a 7-h. p. auxiliary gasoline engine, which drives the compressor of the air starting equipment, and the exhauster for building up the fire in the producer. By a special belt it can be used for raising the anchor and also for pumping out. In regular operation this is done by the drainage pumps provided for the purpose. After the regular layover of six to eight hours, the plant can be started again in a quarter of an hour with absolute certainty.

The following table gives the weight

of the machinery parts in pounds per indicated horsepower.

Engine complete, including fly wheel and reverse gear.....	158
Producer, lining, scrubber, and water in apparatus.....	189
Pumps, auxiliary engine, and other parts	15½
Piping	13¼
Fuel in producer	13¼
Total	389 per i. h. p.

These weights, it is claimed, could now be considerably reduced.

The weight of a triple-expansion steam engine of the same indicated horsepower would be:

Engine	198
Boiler	176
Auxiliaries and piping.....	60
Water in boiler.....	62
Total	496 lbs. i. h. p.,

which is said to be a fair average.

It therefore appears that the marine producer gas engine plant is 20 per cent lighter than a steam plant of the same indicated horsepower and requires less room. The cost of the gas plant is about 10 per cent greater than that of the steam plant.

The suction gas tug Deutz had by Sept. 20, 1909, or about three months after its first start, already made 12 round trips, or 1,200 hours of towing, which speaks well for its reliability of operation. The tug can average 3⅛ miles per hour against the river current with two loaded tow boats with a total paying cargo of 3,200 tons. The tug with its tow makes a round trip in a little over 100 hours. Including coal used by auxiliaries and coal used during layovers, it averages 550 lbs. of lignite briquettes per hour. This average is for 719 hours' run, and includes all coal burned during this time. At a cost of $2.16 per long ton for the briquettes, the fuel cost for the round trip is $\frac{100 \times 550 \times 2.16}{2240} = \$55.00$. A barrel of lubricating oil containing 50 gallons is used each round trip. The crew for 16 to 18 hours, consists of captain, wheelsman, machinist, helper, one or two laborers, and a sailor, or six to seven people in all.

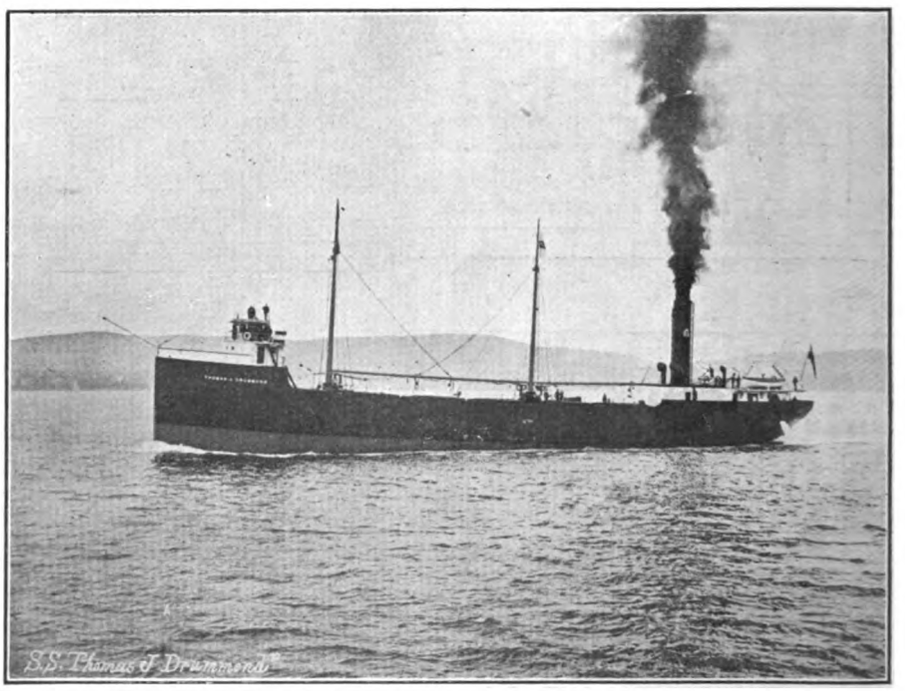
The attention to the producer consists principally in coaling, which is done by raising fuel by the bucket, using a winch, which is arranged to make it easy to drop the coal directly into the producer. There are two such lifts, one each for the port and starboard bunker. The fire is coaled every half hour, using one bucket from each side. Every two hours the grate is shaken a few times and every eight hours the fire is clinkered. This work is done without dust or dirt.

It is true that a steam plant of the same rated power can carry an overload occasionally, or even steadily, but this is at the expense of fuel economy. A steam plant cannot hope to use less than 2½ to 3 times as much fuel for the same work under the most favorable conditions, and when driven beyond its rating, it smokes badly and the fuel economy is even worse. The gas plant has the advantage of being absolutely smokeless, and to permit forced driving, which has grown to be a custom, the rated power should be fixed with this consideration in view.

The gas power tug is said to have surpassed the expectation of the builders in every respect, and while no doubt considerable work is still required to perfectly adapt the design of the power plant to the various kinds of marine service, the foundation of success has been assuredly laid. We may look forward to seeing on all our rivers within a few years clean and smokeless producer gas power boats operating with an economy and efficiency formerly unattainable.

LAKE STEAMER THOMAS J. DRUMMOND.

Archd. McMillan & Son, Ltd., Dockyard, Dumbarton, Scotland, who have now constructed a large number of vessels for the Canadian lakes of both the bulk carrier and package freight type, have just completed an addition to the fleet of The Algoma Central & Hudson Bay Railway Co., in the steamer Thomas J. Drummond. The vessel, which is of the single deck type, is named after the president of the company, and is of the following dimensions: Length, 248 ft.; breadth, 44 ft.; depth, 26 ft.; is built to British Corporation survey, with scantlings entitling her to trade in any waters, and is specially designed for carrying rails and bulk cargo, her arrangements being such that these may be handled with the greatest possible facility. The hold space is divided into three compartments, and extra strength is introduced in the structure of the vessel where additional strains are likely to be experienced when engaged in her special trade. A cellular double bottom of extra depth over rule requirements, and fore and after peak tanks, are arranged for carrying water ballast. Her deck machinery, including winches, windlass, and capstan, is all arranged for the speedy and easy handling of the vessel. The steam steering gear is on the Wilson-Pirrie principle, working direct on to the rudder quadrant—the rudder being of the usual balanced lake type, and fitted with coupling to permit of easy removal. A large coal bunker is fitted on deck as well as bunkers alongside boilers, all arranged so that trimming can be practically dispensed with. Electric light is fitted throughout the vessel, including holds. Accommodation is provided in the forecastle forward for mates, wheelmen, watchmen, and deck hands; a suite of rooms with bathroom are arranged for owner, while the captain's accommodation, including bedroom, bathroom, office, and chart room is arranged in Texas house on top of forecastle. A wheel house is fitted on top of Texas house with



THE BRITISH-BUILT LAKE FREIGHTER THOMAS J. DRUMMOND.

telegraph for docking and telegraphs and whistle pulls to engine room. The engineers are accommodated aft, where also the dining saloon, pantry, galley, mess-room, and ice house are placed. The vessel is propelled by machinery of the triple-expansion, single-screw type, having cylinders 20½, 33 and 54 by 36-in. stroke, supplied with steam from two boilers 14 ft. by 10 ft. 6 in., working at a pressure of 190 lbs. The main engines are controlled by steam and hydraulic starting and reversing gear, and have also steam turning gear; Weir's special feed pump is fitted, also feed heater, Crompton's atmospheric self-tipping ash hoist, and the whole engine room equipment is thoroughly up-to-date.

The Drummond will be principally engaged in carrying steel rails from Sault Ste. Marie to Fort William and Georgian Bay ports.

Steel Screw Colliers Coastwise and Transportation

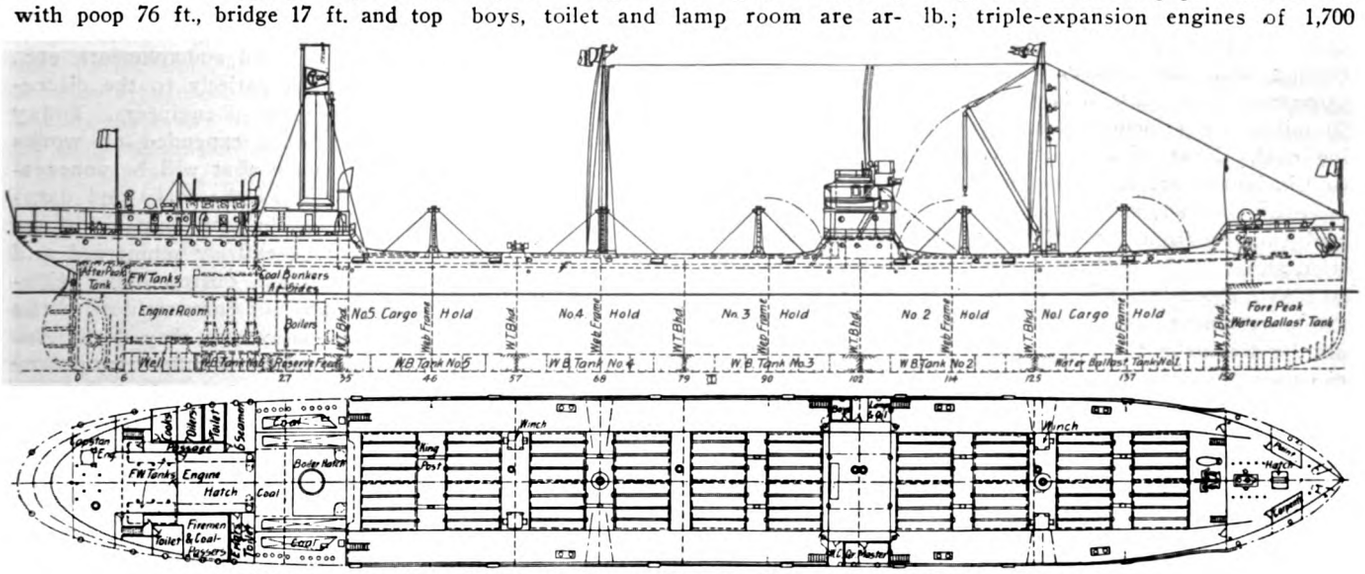
TWO steel single screw colliers were recently completed by the New York Ship Building Co., Camden, New Jersey, for the Coastwise Coal Co. trade between Baltimore and Boston; both are of the following dimensions:

Length between perpendiculars....	360 ft.
Beam molded	49 ft.
Depth molded to upper deck.....	30 ft.
Load draught	22 ft. 6 in.
Deadweight at this draught.....	6,400 tons
Gross, tonnage	4,015
Speed, loaded, at sea.....	11 knots

The vessels are of steel, built in accordance with the rules of the American Bureau of Shipping, single deck, with poop 76 ft., bridge 17 ft. and top gallant forecastle 34 ft. long, seven steel water-tight bulkheads, straight stem and semi-elliptical stern, with two pole masts. The five cargo spaces are clear of hold beams and pillars, the deck being supported by deep arched beams and web frame midway between the bulkheads, with a deep girder carried all fore and aft forming a trunk 24 in. above the upper deck. Ten cargo hatches 15 ft. 2 in. long by 27 ft. 6 in. wide are arranged closely spaced on top of the trunk to facilitate the rapid loading and discharging of the cargo. Hatch covers are steel, hinged in two pieces, water-tight and provided with special lifting gear and posts for supporting same when open. Two steam winches from which leads are taken for operating hatch covers, are placed on top of trunk at each end of the vessel.

Accommodation for captain's saloon, spare stateroom, officers, etc., is provided in a large steel deckhouse on bridge deck, with a pilot house on top of bridgehouse. Quartermasters, boys, toilet and lamp room are arranged in rooms at sides in bridge erection. The engineers are berthed in a deckhouse on poop deck alongside engine casing; the galley, messes, ice-room and galley stores being arranged abaft the same. Entrance to crew and firemen accommodation in poop is provided in the after deckhouse, and the seamen, firemen, oilers, assistant cooks, toilets, etc., are berthed in poop alongside engine casing. There is a steam windlass forward, the engine being located on the upper deck in the forecastle; the wild cats and warping drums are on the forecastle immediately above. A capstan is also provided on the poop deck with engine on upper deck below. Steam steering gear is fitted on the upper deck in the poop abaft the engine casing, with connection to pilot house. Auxiliary hand steering gear with right and left hand screw is attached directly to crosshead on the rudder stock. Two metallic lifeboats are provided and fitted under Mallory davits on the poop deckhouse, a wooden working boat being also provided on the bridge deck. Vessels are well provided with all the necessary bitts, cleats, etc., for mooring purposes, and a special towing bitt and chock is fitted aft. An extra deep double bottom is fitted for the carriage of water ballast, with feed water under the boilers. The fore and after peaks are arranged for water ballast. Coal bunkers are arranged at side of boilers and in 'tweendecks alongside boiler casing, with pockets to fire-room. The propelling machinery is placed aft and consists of two single ended Scotch boilers 17 ft. diameter by 11 ft. 4 in. long, with a working pressure of 175 lb.; triple-expansion engines of 1,700 I. H. P., with cylinders 24¼, 38½, 64 in. diameter by 45 in. stroke, with a surface condenser attached; propeller 16 ft. diameter.

The trial trips were run on the Delaware river course at Deep Water point in fully ballasted conditions, during which a mean speed of 13 knots per hour was obtained, with somewhat more than the normal horse power mentioned above. In loaded condition the vessels have maintained an average speed between Baltimore and Boston of slightly in excess of 11 knots, carrying a full coal cargo.



PROFILE AND DECK PLANS OF STEAM COLLIERS COASTWISE AND TRANSPORTATION.

What Is Needed On the Ohio

IF there is one river in the United States that should justify the expense of improvement, that river is the Ohio. Still it is doubtful, if, under the present system, the benefits that will be derived from the completed improvement will justify the expense. Records will show that more than twenty millions of dollars have been spent by the government in improving the Ohio, considerable of which has been actually wasted on works of no value to navigation. To attain the results desired, to provide for continuous navigation, will require at least a further $85,000,000. But this will not provide for maintaining the improvement; and it is doubtful if it will cover the first cost, unless the methods are radically changed.

No one will question the great benefits to be derived from improved rivers, but we must keep the cost within reason or our improvements will become a burden. The Kanawha river is an example of improvements which will explain the point. It cost the government to improve the Kanawha more than $5,000,000, and it costs today more than $100,000 a year for operating and maintaining. This improvement provides 6 ft. navigation for 90 miles, the principal commerce being coal. Most of that coal is sent to Cincinnati, but it brings the same price as coal shipped by rail and as coal shipped from the Pittsburg district, although the coal from Pittsburg is towed about 300 miles farther. If the government charged enough toll on the Kanawha to merely meet the expenses of operating and maintaining, not considering the first cost of more than $5,000,000, the commerce would, no doubt, fall off to such an extent as to make the toll rates prohibitive. In 1909 (calendar year) only 1,035,401 tons were carried, of which 1,003,274 tons were coal and timber.

Do Not Justify Improvement.

Take the Muskingum, the Little Kanawha, the Big Sandy and its two forks, and the Kentucky; not one will ever justify the expense of improvement, unless the entire system is changed. How then can we expect the Ohio to justify an expenditure of more than $100,000,000 with an annual expenditure of at least $2,000,000 for operating and maintenance? We are losing sight of this operating expense in these improvements; an expense which will likely prove a burden in time unless taken care of by those who receive the direct benefits from the rivers.

The Ohio is 975 miles long; its waters wash six states; it flows through rich country—with much good farm land, many large iron and steel mills, large manufactories, etc. There are large deposits of coal along the banks of its tributaries. Such important cities as Pittsburg, Cincinnati, and Louisville are on its banks, not to mention Wheeling, Marietta, Parkersburg, Huntington, Covington, Madison, Evansville, Paducah, and Cairo. Should not the improvement of the Ohio be justified under such conditions? Still, consider the expense to be incurred to improve 975 miles of river, and the expense for maintaining such improvement. Consider that this work of improvement has been in progress for more than 80 years without appreciable results, and that more than twenty millions of dollars have been spent. Is it not time to call a halt—to inaugurate some new system for carrying on the work of improvement? We must have a change—results commensurate with the funds expended should be obtained or the work abandoned. There is no doubt that such results can be obtained, but not under present working conditions.

Adoption of Business Methods.

Business methods, methods that are recognized by first-class organizations, must be adopted. Every dollar spent should bring a like return in results. Men should be employed who are interested in the work. Plans for the structures should be standardized. Uniformity should rule. Work of improvement should be commenced at the source of the river and carried downstream step by step. The entire work should be under one managing head; in other words, it should be directed from a central office where all information relative to the river and its improvement should be available.

Today there are four separate offices in charge of the work on the Ohio, in addition to which there is a board of engineer officers. Not one of the offices has a complete record of the work done or in progress on the entire river. This is not business as carried on by successful concerns, nor can such methods bring results at reasonable cost. Think of it, the present system of improvement for the Ohio river was inaugurated in 1875 and actual construction work begun Aug. 19, 1878, on Dam No. 1, about five miles below Pittsburg. That structure was available for navigation in 1885. Twenty-four years later locks and dams (five) were built extending slack-water navigation a distance of about 30 miles below Pittsburg at a cost of more than $6,000,000. That is, it has cost the government more than $6,000,000 to provide slack-water navigation for a distance of 30 miles. And those works are not completed, although available. This amount does not include the cost of operating and maintaining the improvements—it represents first cost only. For operating and maintaining Dams Nos. 1-6 during the year ending June 30, 1909, it cost the government $119,954—part of the locks and dams were not available until late in that year.

New Method of Appropriating Funds.

If congress intends to provide for improving the Ohio river by canalization, it should adopt a new method of appropriating funds. In the first place, instead of providing funds for each lock and dam, yearly appropriations should be made for the entire river to be applied as directed by the chief of engineers, U. S. Army. The application of funds to dredging harbors, building dikes and embankments, etc., should be left entirely to the discretion of the chief of engineers. Today funds are being expended on works of improvement that will be unnecessary as soon as the locks and dams are available; in fact, some of those works will be entirely submerged and may then form obstructions. Congressmen are not conversant with the conditions—how can they be? Another uncalled for condition would be eliminated—the building of locks and dams for the benefit of certain cities, instead of for the benefit of general navigation. For example, slack-water navigation is available to Dam No. 6; Dam No. 8 is nearing completion but no provision has been made to build Dam No. 7. Of what benefit will Dam No. 8 be to navigation interests until Dam No. 7 is completed? Dam No. 11 is nearing completion, but it will take fully five years before Dams Nos. 9 and 10 are available. Had the work of canalizing been done systematically, slack-water navigation on the Ohio would have been extended to below Wheeling. This was designated as the worst stretch by the late Colonel Merrill.

Need of Central Office.

To carry on the work, a central office, with an experienced officer in

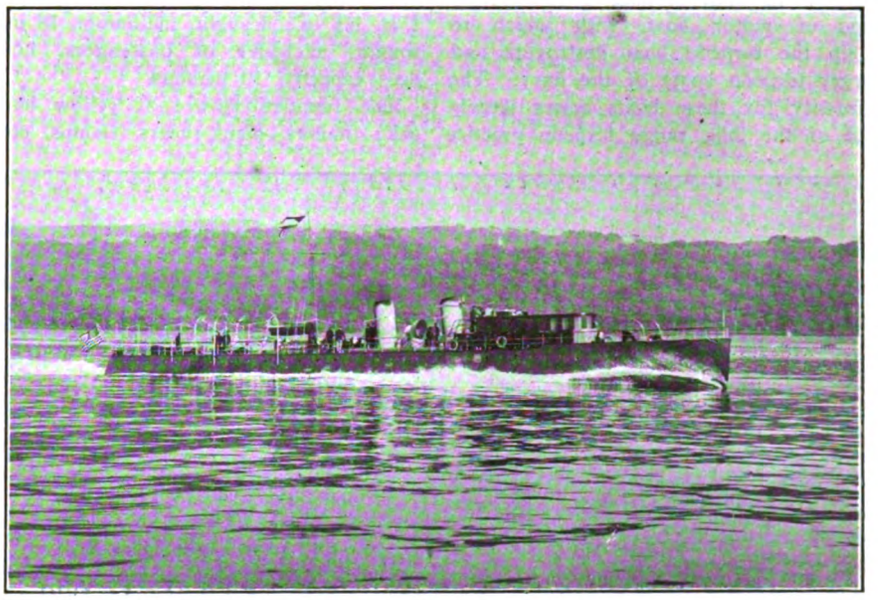
charge, should be established with branch offices conveniently located to the works under construction. The branch offices should be in charge of junior officers. A board consisting of the senior and the more experienced of the junior officers should consider and act on all plans for new work, and for the conduct of all work on the river. The senior officer should be relieved from all routine office work, so that he may devote his time to the more important executive and engineering work. To this end there should be a junior officer as secretary and disbursing officer.

A central office would reduce the number of clerks, draftsmen, and junior engineers required; it would permit the employment of capable engineers, mechanical engineers and draftsmen, and architects, the service of such men being badly needed; and it would insure uniformity in plans, specifications, and methods of construction. It would simplify the accounting both in Washington and in the district; it would reduce the amount of plant necessary; it would reduce the clerical work required in procuring land for lock sites; and it would reduce the expense necessary in procuring supplies, plant, material, etc. Furthermore, it would place this work on a business basis, which is absolutely necessary if tangible results are to be obtained.

THE TURBINE YACHT WINCHESTER.

The fast steam yacht Winchester, which has been built by Messrs. Yarrow & Co., of Glasgow, for P. W. Rouss, and is for his use on the Great Lakes, left Queenstown in tow on her passage across the Atlantic at the end of May.

The estimated speed of the Winchester was 26 knots, but the mean speed obtained on a two hours' trial was 26.7 knots. The dimensions of the vessel are: Length, 165 ft.; beam, 15 ft. 6 in. She is built on torpedo lines. The propelling machinery consists of three turbines of Parsons type, constructed by Messrs. Yarrow & Co., her builders, with three shafts, one propeller on each shaft. The port shaft is actuated by a high-pressure turbine, the center shaft by a low pressure turbine in which is incorporated an astern turbine, and the starboard shaft by a middle-pressure turbine. Steam to the turbines is supplied by two Yarrow water-tube boilers, constructed for burning oil fuel exclusively. The accommodation for the owner, which is below deck abaft the machinery space, and is very commodious and handsomely decorated, consists of a double stateroom, two single staterooms, drawing room, bath room, and toilet rooms. There is a teak deckhouse forward, 25 ft. long, containing



TURBINE YACHT WINCHESTER.

dining room, captain's cabin and pantry. The quarters for the officers and crew and the galley are below the main deck forward. The vessel has a complete electric light installation, and is heated by steam.

MOTORS ON THE HIGH SEAS.

Every day the possibilities of the oil motor for work on the high seas become more apparent, while the utility and reliability of the internal combustion motor for propelling sea-going ships have been placed beyond doubt. In this connection the cruise of Bolinders VII, round the coast of the British Isles has provided a very practical demonstration of the high level of efficiency attained by modern marine oil engines. The cruise was also made the occasion for an exhaustive trial of crude oil as motive power.

Bolinders VII is 60 ft. long by 19 ft. by 9 ft., and is fitted with a 80-B. H. P. Bolinders direct reversible crude oil engine. She started her cruise at the beginning of December, and had to brave the winter storms and weather. After touring the English and Bristol channels and the Irish coast, a trip was arranged from Queenstown to Londonderry. The Bolinders VII had previously made non-stop runs, on Russian petroleum, of such distances as 300, 500, 600, and 700 miles.

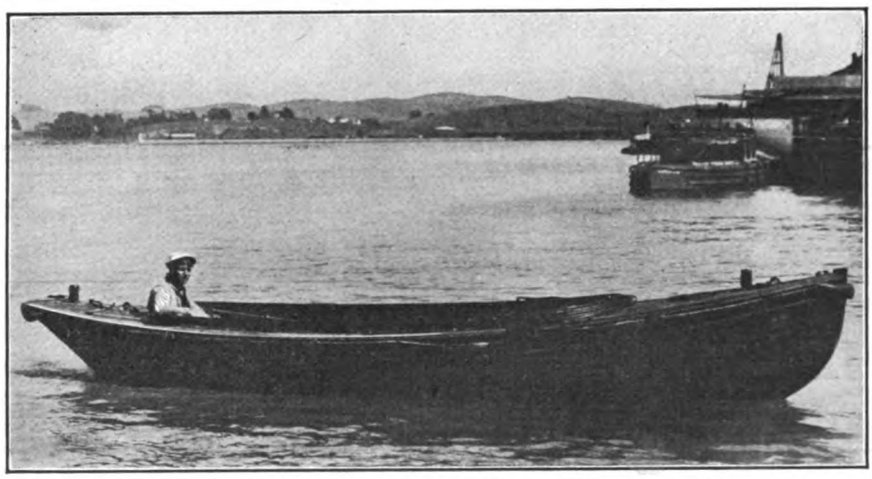
The trip from Queenstown to Londonderry was undertaken for the purpose of showing that a non-stop run of 400 miles was possible on Scotch shale oil fuel. At 2:30, on Tuesday, April 26, the Bolinders VII started on what turned out to be a very rough cruise. By midnight, Carnsore Point had been brought abeam, but, with a strong north-easterly wind springing up, progress was found to be laborious. The governor, however, fulfilled its purpose admirably by keeping the number of revolutions the same, whether the propeller was in or out of the water. At daybreak on Wednesday, the crew caught a glimpse of Wicklow, and by mid-day, Bolinders VII was well out at sea off Dublin, the Irish port at which she had caused such a sensation by her maneuvering powers. Steady progress was made from this time onward until Rathlin Island was reached, when a full hurricane was met, with the result that the last 40 miles of the trip were made under the worst possible conditions. Eventually Bolinders VII arrived at her moorings at Londonderry, where the crew took a real well-earned rest.

To ascertain the condition of the cylinders after this exhaustive trial, the covers were removed, and the deposit was found to be so slight as to be hardly worthy of mention. The distance of 400 miles was accomplished in 47 hours, and during the voyage, 160 gals. of Scotch shale fuel oil at 5 cents per gal. were used, giving 2.5 miles to the gallon. The cost of propulsion, therefore, works out at 2 cents a mile. Without doubt the time is not far distant when the crude oil engine will be a formidable opponent of the steam engine, on account of the fact that it requires less skilled attention, and allows a larger space to be devoted to carrying cargo.

The Navy Standard Motor Dory

By F. G. Coburn.

THE navy department has for some years been seeking a satisfactory type of motor boat, with which to equip the torpedo boat destroyers and larger torpedo boats of the navy. The necessity for these boats arises largely out of the long range torpedo practice now followed; it takes too much time to recover a torpedo after a 3,000 or 4,000-yard run, and then, too, there is sometimes the danger of losing the projectile unless picked up at once. As a torpedo costs $5,000, and has to be run a good many times before its individual idiosyncrasies are known and it becomes of military value, the loss of one would pay for a small fleet of motor boats.



United States Navy Standard Motor Dory.

As the torpedo flotillas require plenty of room for torpedo practice and maneuvering, their haunts are large bays and open roadsteads, where there is usually considerable sea, so that the boats must be very seaworthy. This requirement, combined with the hard usage the motor boats get, effectually rules out the ordinary type of motor boat affected for pleasure seeking. These boats, with their flat sterns and frail construction, were neither sufficiently seaworthy nor robust to fill the bill, and after several years' trial, have been abandoned.

The latest type, illustrated by the accompanying drawings and photographs, bids fair to solve the problem. The boat is of light weight, but of rugged construction. It is a regular dory type, cranky and wet, but will live in any sea, and except for the wetness, which may perhaps be relieved by slightly flaring the bows, is giving good satisfaction. Its general dimensions are as follows: Length of water line, 17 ft. 4 in.; length over all, 20 ft. 10 in.; beam on water line, 4 ft. 4 in.; beam, maximum, 5 ft. 7 in.; molded depth, 2 ft. 1½ in.; draught, maximum, 18 in.; weight, exclusive of passengers, 1,685 lbs.; capacity, 10 persons.

The foundations are of yellow bark oak; timbers, plank-sheers, clamps, etc., of white oak; planking of cedar; and interior finishings and deck of pine.

The boats were at first equipped with 4-H. P., single-cylinder, two-cycle engines, 800 R. P. M., with reverse gear; the propeller being three-bladed and of 14-in. diameter and 18-in. pitch. With this equipment the boat made five sea miles per hour, over a measured course, with a gasoline consumption of one-fifth gallon per mile. The boat has a gasoline tank of 35 gals. capacity. The last lot of six, built at Mare Island, is being equipped with 4-H. P., single-cylinder, four-cycle motors, 600 R. P. M., with reverse gear, with the same propeller; and as all these engines developed over 5 H. P. on test, a little more speed and ability are looked for. No data are at present available on their performance in service. As these last motors have the make and break ignition, it is probable they will prove more serviceable, as past experience in these motor boats has pretty well established the superiority of this type.

SUEZ CANAL REPORT.

The report of the Suez Canal Co. for 1909, which was submitted to the annual meeting of shareholders on June 6, states that the year's working results were highly satisfactory, owing to the general improvement in trade, more especially in the agricultural industry of India. For the first time since the opening of the waterway the receipts from shipping were over $24,000,000, the total amounting to $24,695,576, an increase of $2,397,374 over 1908. The expenses were $8,673,856, a reduction of $308,720, the surplus of receipts over expenditure being $16,020,170. After setting aside a sufficient sum for the statutory reserve, there remained a net balance of $15,577,318. Payment of a dividend at the rate of $30 per share, an increase of $1.80 on the rate for 1908, absorbed $15,100,000, leaving a balance of $8,100 to be carried forward. As a result of this increased prosperity, the transit dues are to be reduced 10 cents per ton from Jan. 1, 1911, when the impost will be $1.50 per ton, and it is hoped to lighten the burden on ship owners still further. During the year, 4,239 vessels of 15,407,527 tons net passed through the Canal, the increase over 1908 being 444 ships and 1,774,244 tons. Owing to an improvement in transit facilities, the average passage was reduced to 17 hours 13 minutes, and it is hoped that, as a result of the works now in progress, the time will be accelerated. In consequence of the rejection by the general assembly of the Board's proposals for a renewal of the Canal concession and of the continued opposition of the Egyptian Nationalists, all negotiations on the subject have been abandoned.

NEW HAMBURG-AMERICAN LINER.

Some particulars are now made known of the mammoth liner for the Hamburg-Amerika Co., which is now being built for the company by the Vulcan yard at Stettin. The vessel will have a length of 879.3 ft., a breadth of 95.2 ft. and a depth from the upper deck of 64 ft. She will register over 45,000 tons and will be propelled exclusively by turbines, giving her a maximum speed of 22 knots. The vessel will be larger than any vessel now built or building, and her size may be estimated by a comparison with the dimensions of the Cunard liner Mauretania, which are: Length, 761 ft. 2 in.; beam, 88 ft. 7 in.; depth from upper deck, 56 ft. 6 in., and tonnage, 32,500.

BRITISH CRUISER TRIALS.

The British protected cruiser Liverpool, built by Messrs. Vickers Sons & Maxim, of Barrow, who have also installed the engines, has completed her official trials with remarkable success. She attained a speed of 26.17 knots with an average of 24,700 shaft horsepower, as against the guaranteed speed of 25 knots and 22,000 shaft horsepower. She has been built and completed in 16 months from the laying of the keel. The Liverpool is 300 ft. long, 37 ft. broad, with 15 ft. 3 in. draught, and a displacement of 4,800 tons.

MARITIME LIEN LAW.

Congress has passed the maritime lien law, known as House Bill No. 15812. This measure relates to liens on vessels for repairs and supplies and will produce a considerable change in existing practice. The bill was drafted by a committee of the Maritime Law Association of the United States. It was adopted at a meeting of that association after a full discussion, and its adoption is also recommended by the American Bar Association.

This bill is proposed to remove the confusion now existing in an important branch of the admiralty jurisprudence of the United States by simplifying the law and making it uniform throughout the country.

Under the admiralty law, as now administered in the United States, a lien is implied for necessaries furnished a vessel in foreign ports or states, so-called; and for this purpose the various states of the Union are regarded as foreign to each other.

In the home state, so-called, a lien is not implied unless conferred by the local law. Home state has been identified with the state of ownership, and in the ports of the home state the vessel is said to be "domestic." In all other ports, even though they may be ports of other states of the United States, the vessel is termed a "foreign" vessel.

Most, if not all, of the maritime states of the United States have passed statutes providing liens for necessaries furnished to a vessel of the state—that is, to a so-called "domestic" vessel. But these statutes vary greatly in their scope and phraseology, and the task of construing them has been a heavy and unnecessary burden on the Federal courts, and has caused much confusion. For although the lien is conferred by a state statute, it can be enforced only in the courts of the United States, inasmuch as the subject matter is maritime, and hence, under the Constitution, within the exclusive jurisdiction of the Federal courts.

It has been stated by the Supreme Court of the United States, and is generally conceded, that the distinction made in this country between "foreign" and "domestic" vessels with respect to liens for necessaries is not only artificial but contrary to the law of maritime Europe (which makes no account of the domicile of the vessel) and to the theory of the English law. A contract for necessaries is maritime, whether made in the home port or in some other port, and as such does not depend upon the local law.

Along with this arbitrary division of American vessels into two classes there has developed in this country a doctrine which seems to have no counterpart in Europe, that when the owner of a vessel contracts in person for necessaries, or is present in port when they are ordered, no lien arises. The result has been much uncertainty in the administration of our admiralty law.

Under the Constitution of the United States the state legislatures cannot regulate the admiralty and maritime law of the United States. The power to do this rests with Congress alone. The state statutes have been enforced in the absence of congressional legislation, but the Supreme Court has recognized the right of Congress to deal with the matter of liens for necessaries, and it has been assumed that Congress would some day pass a law upon the subject.

The bill as passed is as follows:

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That any person furnishing repairs, supplies or other necessaries, including the use of drydock or marine railway to a vessel, whether foreign or domestic, upon the order of the owner or owners of such vessel, or of a person by him or them authorized, shall have a maritime lien on the vessel which may be enforced by a proceeding in rem, and it shall not be necessary to allege or prove that credit was given to the vessel.

"Section 2. That the following persons shall be presumed to have authority from the owner or owners to procure repairs, supplies and other necessaries for the vessel; the managing owner, ship's husband, master, or any person to whom the management of the vessel at the port of supply is untrusted. No person tortuously or unlawfully in possession or charge of a vessel shall have authority to bind the vessel.

"Sec. 3. That the officers and agents of a vessel specified in section 2 shall be taken to include such officers and agents when appointed by a charterer, by an owner pro hac vice, or by an agreed purchaser in possession of the vessel, but nothing in this act shall be construed to confer a lien when the furnisher knew, or by the exercise of reasonable diligence could have ascertained, that because of the terms of a charter party, agreement for sale of the vessel, or for any other reason, the person ordering the repairs, supplies or other necessaries was without authority to bind the vessel therefor.

"Sec. 4. That nothing in this act shall be construed to prevent a furnisher of repairs, supplies, or other necessaries from waiving his right to a lien at any time, by agreement or otherwise, and this act shall not be construed to affect the rules of law now existing either in regard to the right to proceed against a vessel for advances, or in regard to laches in the enforcement of liens on vessels, or in regard to the priority or rank of liens, or in regard to the right to proceed in personam.

"Section 5. That this act shall supercede the provisions of all state statutes conferring liens on vessels in so far as the same purport to creat rights of action to be enforced by proceedings in rem against vessels for repairs, supplies and other necessaries."

DEPRECIATION OF SAILING TONNAGE.

One of the English papers has made an interesting table, showing the rapid depreciation of sailing tonnage. During the first three months of 1910, about 30 sailing ships, a majority of them British, were sold. Norwegians, Germans and Italians have been the heaviest buyers, and a comparison of the prices shows how rapidly sail tonnage has depreciated in value. Since 1907, prices have been tumbling at a rapid pace and among the late sales not a few smart and well-found square-riggers have been sold for a mere song. The following table shows the large fleet recently disposed of and the price per gross ton indicates how low values have gone:

Vessel	Gross Tons.	Built.	Sold For.	Per Gross Ton.
JANUARY.				
Ladas	1,391	1894	£2,850	£2.03
Chelmsford	2,347	1893	4,900	2.08
Socotra	1,704	1891	3,300	1.94
MARCH.				
Scottish Glens	2,117	1895	*3,000	1.44
Sardomene	2,000	1882	2,800	1.48
Robert Duncan	2,166	1898	4,000	1.85
Este	1,420	1891	2,750	1.94
Balmoral	2,614	1892	5,250	2.00
Ben Dearg	2,349	1894	5,000	2.12
Forteviot	3,145	1891	6,500	2.08
Sokoto	2,262	1887	3,150	1.40
Ballachulish	1,901	1892	3,875	2.04
Clan Galbraith	2,149	1894	4,400	2.04
Pera	1,758	1890	3,350	1.90
Craigerne	1,905	1889	3,100	1.74
MacDiarmid	1,625	1883	2,400	1.48
Waterloo	1,976	1878	2,400	1.21
Pegasus	2,631	1884	3,500	1.31
APRIL.				
Blackbraes	2,207	1892	4,000	1.75
Craigmore	2,000	1895	4,250	2.125
Loudon Hill	2,139	1887	*3,100	1.45
Largo Bay	1,255	1878	1,500	1.115
Austrasia	2,718	1892	5,200	1.84
Corryvrechan	1,356	1885	2,150	1.59
Walden Abbey	1,799	1881	2,300	1.26
Wiscombe Park	2,229	1892	4,000	1.80
Crown of Germany	2,241	1892	4,150	1.85
Pass of Killicrankie	1,746	1893	3,375	1.96
Lodore	1,669	1892	2,300	1.39

*About.

The Spedden Shipbuilding Co., Baltimore, Md., began work on a steel tug 125 by 24½ ft., to be equipped with a triple-expansion engine and Scotch boiler.

Tarr & James, Essex, Mass., launched the whaler Viola for John A. Cooke, of Provincetown. This craft is about 123 ft. long, 25½ ft. beam, and 12 ft. deep. She will carry a crew of 23 men. This vessel was built under the rules of the Record of American and Foreign Shipping of the American Bureau of Shipping, and is rated A-1 for 15 years.

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THROWING MORE DUST.

Secretary of the navy Meyer is either the most persistent self-advertiser in public life or else he should pray for deliverance from his friends. A statement recently given out in Washington claims for him credit for economy in the use of coal which has been brought about by systematic firing, and economy of steam, replacing defective joints and journals and stopping leaky valves. On the Montana a saving of 15 tons of coal daily is claimed as being due to the systematic firing introduced by Secretary Meyer. With reference to oil, the saving has been as great. On the battleship Georgia, also, improved evaporators have reduced the cost of making fresh water 40 per cent. It is also claimed for the much advertised reorganization plans that they include the systematic overhauling of the vessels at the navy yards after each cruise, which permits the continuous employment of expert machinists, many of whom formerly would be dismissed after a piece of work was done and not be available when needed again; also that thousands of dollars have been saved in repair work by having repair shops on shipboard. Credit is also claimed for Secretary Meyer for the establishment of a school of marine engineering at Annapolis, wherein it is hoped to train for special work engineering officers who give promise of being of special value in that branch of the service.

There is just as much truth in the foregoing as in most of the reports that have emanated from the department since Secretary Meyer took charge. In 1905, at least four years before Mr. Meyer became secretary of the navy, the question of fuel economy was actively taken up and an expert civilian was sent with the battleship fleet to teach the so-called engineers the elements of proper firing in order that they might effectively supervise their own stoke holds. It will further be remembered that this question of competitive economy was a strong feature of the famous cruise around the world, from which all events in the navy are now dated. The congressional record of April 4, 1910, in the discussion on the naval bill, shows that as far back as 1905 an appropriation was recommended by the secretary of the navy for the employment of George H. Baker, of Brooklyn, N. Y., a civilian and an expert in the matter of economical boiler management, for the purpose of going aboard and cruising with the ships of the navy and giving instructions in firing and general boiler management, and both Mr. Foss, of the naval committee, and Admiral Evans testified to the value of Mr. Baker's services The results of this instruction are what Mr. Meyer now seeks to appropriate the credit for. It was then asked on the floor of the house why it was necessary to employ a civilian in order to instruct the engineer corps how to fire boilers economically, and why the country was paying for the education of men at the naval academy if civilians had to be employed to carry on the work for which they were trained.

This competition in fuel economy, while desirable and praiseworthy, has led, in the hands of the present incompetent force, to some startling results. For instance, one chief engineer discontinued the use of his surface blows, giving as his reason that he did it to save water and coal, and that very shortly afterward a very serious explosion occurred in the boilers of this very ship with the loss of several lives as an inevitable result.

No one will deny the possibilities for oil economy. We have heretofore drawn attention to the oceans of oil reported as used on the machinery of naval ships, reports which actual observation have proved to be fully confirmed. The discovery of an evaporator which has reduced the cost of making fresh water 40 per cent will come to the engineering world as news of the first importance. Probably, however, the facts of the matter are merely that the cost of making fresh water for the navy has been reduced 40 per cent, which is a very different thing. As to the systematic overhauling of vessels, there has been no change whatever from the old

methods. The cruiser fleet comes in for overhauling and when it goes, a large number of men have to be discharged. Some of the work is, of course, done by the ship's force, as has always been the rule. We have had opportunity to see some of it and of this subject the less said the better.

The statement that thousands of dollars have been saved in repair work by having repair shops on shipboard is merely moonshine. The policy in this respect has not been changed in the slightest degree under the present administration. Long before Secretary Meyer began rattling around in the navy department each ship was fitted with a small shop and these ships still have their shops and no others.

The credit that is claimed for the new administration for training men in marine engineering is the most amusing of all. When Chief Constructor Capps was made active chief of the bureau of marine engineering by Secretary Newberry, he immediately brought this subject to the latter's attention and outlined a course of three years at the Massachusetts Institute of Technology. His recommendation was approved by Mr. Newberry and a general order was issued for the establishment of the school and officers were invited to make requests for detail. Very shortly after this Mr. Newberry went out of office. Mr. Capps' plan is being carried out absolutely except that the location of the school was changed from an outside institution to the naval academy, which progressive naval officers consider to be a mistake, for the reason that not only would the instruction at Boston have been very much better, but the officers detailed would have rubbed shoulders with the outside world, and this experience, of which they stand in sad need, would have been of great value.

So long as the navy is dominated by Secretary Meyer or others of his type it will fall short of fulfilling the ideals of what a navy should be.

FOREIGN SHIPPING INTERESTS AND THE ASSOCIATED PRESS.

If the Merchant Marine League investigation has done nothing else, it has opened wide the eyes of the reading public as to the lengths and reaches that the foreign shipping interests will go to mold, influence, direct and control American shipping. The fact that it had on its pay roll one of the managers of the Associated Press in Washington was as electrifying and illuminating as a flash of lightning across a dark sky. It was not expected that it would seek to mold public opinion right at its fountain head; yet it is so. How much information of a character hostile to American shipping interests has been disseminated through this agency during the past ten years; how much information of a character favorable to American shipping interests has been withheld and suppressed during the past ten years must be left to one's imagination. It certainly throws much light upon a fact, hitherto puzzling, that the Associated Press was carrying so little in its columns from day to day of the Merchant Marine League inquiry. It appeared as though the activities of the Associated Press were growing less as the cause of American shipping grew stronger.

It came as a shock to the unsophisticated public that for the past ten years Jerome J. Wilbur, who has been for 25 years connected with the Associated Press in Washington and at present assigned to the State War and Navy Building, had been in the employ of two leading foreign steamship companies, the Hamburg-American Line and the North German Lloyd Steamship Co. Mr. Wilbur was reluctant to state what his compensation was, but Mr. Emil Boas, managing director of the Hamburg-American Line, stated that it was $3,000 per annum, of which sum one-half was contributed by his company and the other half by the North German Lloyd.

Apparently the Associated Press has something of that philosophy commonly credited to France, that crime consists solely in being found out, for the officers of that concern immediately issued a statement that Mr. Wilbur's resignation had been tendered and accepted. For ten long years the Associated Press knew of its representative's connection with foreign shipping interests; but it could not rest under the publicity of this indictment for ten minutes. John P. Gavitt, the Washington manager of the Associated Press, rushed before the committee without a summons to say that he knew and approved of Wilbur's employment by the foreign shipping interests, but did not believe that such connection affected the reliability of the news service. Then the Associated Press followed it up with a statement saying that it having come to the knowledge of the officers of the Associated Press that such a connection existed they had requested Wilbur's resignation, not that he had done anything wrong, but that the knowledge of such connection impaired his usefulness. Doubtless it impaired his usefulness as an impartial collector and distributor of news, but not more so now than ten years ago. The Associated Press certainly does not come out of this affair unscathed.

Coincident with these disclosures came a remarkable speech from Congressman Humphrey, in which he declared that the North German Lloyd in 1898 voluntarily withdrew from its merchant service two of its fastest and best steamships and sold them to Spain for the purpose of preying upon American commerce on the seas, the self-same company that for a dozen years has been carrying a Washington representative of the Associated Press on its pay roll. Did the Associated Press pay any attention to this sensational disclosure of Congressman Humphrey? Not a line of it was carried.

TAKE THE POLITICS OUT OF THE DEEP WATERWAYS MOVEMENT.

In the June issue of THE MARINE REVIEW we urged adoption of sane engineering and business methods in dealing with the deep waterways projects of the middle west, and pointed out that it is only through the use of these methods that the waterways propaganda can be expected to make any permanent headway.

A pointed example of the wrong way of handling this matter—making it a subject for political jugglery—is

shown in the following news dispatch relative to the methods being followed by some Illinois "statesmen" in the appointment of an engineer for the Deep Waterway Board. The dispatch is quoted from the June 21 issue of the Chicago *Tribune*:

"Isham Randolph may be appointed instead of Lyman E. Cooley, to the board of engineers which is to study the feasibility of the deep waterway project so far as it pertains to the Desplaines and Illinois rivers. President Taft has his name under consideration.

"Senators Cullom and Stone of Missouri, and Representatives Graff, Lundin, Madden, and Lowden called on the president this morning and urged the appointment of Cooley, who was slated originally for a position on the engineers board by Senator Lorimer. Mr. Cooley was the engineer who appeared before the senate and house committees urging the appropriations for the Lorimer deep waterway plan. He was retained for this purpose by waterway interests represented by Senator Lorimer.

"As a result of the efforts of Lorimer and his friends, the river and harbor bill carried a provision appropriating $1,000,000 for preliminary work on Desplaines and Illinois rivers in connection with the waterway project, and directing an investigation of its feasibility by two army engineers and one civil engineer from private life. This provision was so framed as to permit the appointment of Cooley.

"It is understood that the president wants to appoint to this board engineers whose minds are unbiased on the waterway project. Mr. Cooley demonstrated, in his arguments before the congressional committees, that his conviction of the feasibility of the Lorimer plan already is deep rooted.

"If the appointment of Cooley is refused by the president, the Lorimer following will object strenuously to Randolph, on the ground that he is committed to the Deneen 9-ft. waterway and opposed to the Lorimer 14-ft. project."

With all due respect we may state that neither Gov. Deneen nor Senator Lorimer are competent to pass on the internal waterways problems of the State of Illinois, and their attitude in this matter is simply blocking the progress of real development for the benefit of navigation and commerce and turning responsible and sensible citizens away from the internal waterways movement in disgust. Deneen for political reasons may favor a 9-ft. channel on the Desplaines and Illinois rivers and Lorimer for similar reasons a 14-ft. channel, and neither of these contentions is based on an unbiased expert study of the commercial and engineering features of the situation. Just so long as the waterways propaganda is used mainly for political capital by irresponsible politicians, the community may expect no beneficial results. The whole business is parallel to the wildcat railroad projects indulged in by many western states 50 years ago, and the fate of those projects is too well known to need comment.

The attempt of the Illinois politicians to get a partisan engineer appointed to their western board is of course only evidence that politics is the uppermost consideration. It is refreshing to note that President Taft wants to appoint an unbiased board of engineers. It appears that the president has a better appreciation of the needs of the people of Illinois than have the governor and senator of that sovereign state.

The waterways problems of the middle west are problems of vast importance and have intimate bearing on the welfare of the Mississippi Valley. It is to be hoped that their solutions will not be left to politicians who have no interests in the question other than selfish ones.

CONGRESSMAN LOUD AND THE NAVAL WASTE.

The Hon. George A. Loud, member of congress from the tenth district of Michigan, is one of the most solid men in the house of representatives. Let that be put to his credit. He is deeply interested in the cause of the merchant marine and is moreover deeply interested in the navy. That is most natural, as he is a member of the committee on naval affairs. It is therefore natural that he should have been somewhat disturbed over the revelations made in the Naval Waste series of articles recently published in THE MARINE REVIEW. The pity of it is, however, that instead of analyzing the revelations made in that series and passing upon them in a calm and judicial manner as becomes a member of a legislative body, he sweeps them aside as so many misstatements of facts. It is surprising that he should do so. There are no misstatements of fact in the series.

As is well known, this series was published in pamphlet form and it is this pamphlet which has aroused Mr. Loud's ire. In a letter he states that he has given the pamphlet careful consideration. It appears to us that he has really given it careless consideration. To begin with, he says that no such amount as $7,000,000 has ever been used for four colliers. The Naval Waste never said that it had. It simply stated that $7,000,000 was asked for the construction of four colliers. The Department estimates will bear up the correctness of that statement.

Mr. Loud admits that the colliers Vestal and Prometheus could have been built in private yards for $1,200,000 each or less, but adds that the extra cost involved was due to the "perhaps needless extra speed of 16 knots per hour and the cabins and accommodations for transport service." These two colliers cost $3,136,492. There is no provision whatever in their construction for transport service, as Mr. Loud intimates. Their excessive cost is due partly to navy yard construction, but chiefly, let us be candid, to fool design. Nothing more foolish in the way of a coal carrier was ever constructed. Fourteen knots is too fast for any bulk freighter; 16 knots is simply silly. There was not a collier in the squad that served the fleet in its trip around the world that could even make 12 knots continuously. The Vestal and Prometheus, if loaded to full capacity, say at Hampton Roads,

could not deliver a single ton of coal at Puget Sound at trial speed. They would burn up all the coal that could possibly be stowed in the bunkers and cargo holds to get them there at that speed.

Mr. Loud states that the two colliers of the Cyclops class are his ideal of what naval colliers should be. Well, the Cyclops, for which Mr. Loud is in a measure responsible, is a more sensible collier than either the Prometheus or Vestal, but nevertheless, if loaded to her full capacity, which, including bunkers, is 12,500 tons, she could only deliver 5,000 tons at Puget Sound at trial speed of 14 knots. Her contract price is $822,500. If reduced to 12 knots she would not only cost far less, but would carry more and would deliver over 7,000 tons at Puget Sound.

The colliers Mars, Vulcan and Hector are by far the most business-like colliers that the navy owns. All three of them put together were built for less money than either the Vestal or Prometheus, while their combined carrying capacity is 80 per cent greater than the combined carrying capacities of the Vestal and Prometheus. They were built by the Maryland Steel Co. and the Navy Department had nothing whatever to do with their design. Naval colliers cannot transport a ton of coal at a cost of less than two to five times what it can be done for in merchant ships—and this, too, with the merchant ship paying 4 per cent insurance charge and interest and depreciation and maintenance and overhead charges which a naval ship is free trom.

Mr. Loud is also disturbed because the Naval Waste stated that the Prometheus and Vestal were five years in building. He calls that another misstatement. The Vestal and Prometheus were authorized in April, 1904. The Vestal went into commission Oct. 4, 1909, and the Prometheus Jan. 15, 1910. It is not difficult to figure five years in the interim. To be sure the keel of the Vestal was laid on March 26, 1907, and the Prometheus on Nov. 6, 1907, but that is neither here nor there. The time of building a ship dates from the time she is taken in hand or the contract signed. The drawings and specifications for these ships were sent out in January, 1905, and were therefore prepared before that date, as Mr. Loud can very readily discover, if he will but read the department reports. There is no misstatement in the fact that it took five years to build these two colliers. Mr. Loud apparently is not posted. On the lakes we built a ship in forty-five working days from the laying of her keel, but the material had doubtless been in process of fabrication and assembly for months before.

WATER CONSUMPTION OF ENGINE ROOM AND DECK AUXILIARIES.

The amount of steam consumed, or rather wasted, by auxiliary machinery aboard ship has always been a vexatious problem for the naval architect. The weight of steam required for the propelling engine can be calculated and provided for with a reasonable degree of accuracy, but the amount required for other purposes is a very large factor in the boiler capacity to be supplied and varies largely even between similar ships. Probably the most elaborate and painstaking investigation of this subject, at least in American practice, was that of the main and auxiliary machinery of the U. S. S. Minneapolis by Passed Assistant Engineer W. W. White, of the United States navy, and reported in volume 10, 1898, of the Journal of the American Society of Naval Engineers, and which has been a standard reference since.

Another paper on the same subject was recently read before the Institution of Engineers and Ship Builders in Scotland, by C. F. A. Fyfe and, while the results noted are to be regarded only as approximations, still they are of value as a check on other figures. The paper contains the results of a number of tests with auxiliary steam machinery under varying conditions. The water measurements were obtained by observing the fall of the water level in the boiler gage-glass, with the feeds shut off, while at the same time the water of condensation in the steam pipes was collected in a drain tank and measured. The results were plotted and consumption curves drawn. It was found that in the majority of cases the water actually evaporated bore a fairly uniform percentage in excess of the calculated weight of steam passing through the cylinders of the auxiliaries, and what variations occurred were generally easily accounted for. Where less steam than was anticipated was used, superheating or wire-drawing had probably been the cause.

It was found that careful handling of winches made a very great difference in the consumption, one operator using in some cases as much as 55 per cent more steam than another, the conditions being otherwise alike in both cases. For instance, a winch with 9 x 2-in. cylinders required, when carelessly driven, 2,790 lb. of water per hour, but when properly driven, 1,930 lb. per hour. Again, one with cylinders 6 x 10-in. consumed 1,040 lb. per hour when operated carelessly, and, when properly handled, 722 lb. per hour. The weather was also found to make a very considerable difference in the steam consumption, since in hot weather there is naturally less condensation in the cylinders and pipes. The conditions affecting the consumption of steam by auxiliaries at sea are, of course, different from those in port, and the auxiliaries themselves are different. It must not be assumed, therefore, that the consumption when in port is much of a guide to the consumption at sea, and weather conditions affect the results less in the latter case. In trials carried out at sea, the consumption of the usual auxiliaries, including feed-pump, ash-ejector, circulating pumps, ballast pump, sanitary and bath-pump, refrigerating machine and pumps, electric engine, steering engine, etc., appears to be, on modern, well-equipped steamers, about 15 or 16 per cent of the total amount consumed.

STEAMSHIP CREOLE'S PERFORMANCE.

Editor MARINE REVIEW:—It will probably interest the readers of your valued paper to know that the S. S. Creole is again in service after having been fitted with reciprocating engines to replace Curtis marine turbines as

originally installed by the builders of the vessel.

The vessel sailed from this port on May 25 in our regular passenger service between New York and New Orleans, and arrived at South Pass, mouth of Mississippi river, at 7:58 p. m., May 29; 6 hours ahead of schedule. On the return trip the vessel sailed from New Orleans on June 1 at 10:10 a. m. and arrived in New York at 3 p. m., June 5; 16 hours ahead of schedule and breaking all north bound records between the two ports. The run south bound, bar to bar, was made in 103 hrs. 15 min., despite the fact that the vessel lost 2 hrs. 45 min. between Scotland Light and Diamond Shoal on account of being operated at reduced speed in dense fog. The run north bound, bar to bar, was made in 92 hrs. 20 min. The average speed over the bottom, bar to bar both ways, was 16.55 knots per hour.

The vessel's new machinery equipment consists of two vertical, inverted, direct-acting, triple-expansion, surface-condensing engines with cylinders 27¾, 46½, and 79-in. diameter by 42-in. stroke, designed for 95 revolutions at 16 knots.

The vessel's boiler equipment is the same as originally installed, i. e.: ten Babcock & Wilcox large tube type marine boilers carrying a working pressure of 210 lbs. above atmosphere with 50 degrees Fahr. superheat.

The vessel was operated with the usual complement of men in the deck and engine departments taken from our regular service.

A. S. HEBBLE,
Superintending Engineer.

REMOVING SCALE BY PIECE-WORK.

Editor MARINE REVIEW: — We are much interested in an article in your issue of June, 1910, page 222, on removing scale under the piece-work system.

There is one point in this article, however, which is not clearly set forth, and that is, how the berths for piece-workers are laid out on the side of the ship.

Of course, we understand that a berth amidships comprises a considerably greater area per longitudinal foot than a berth at the bow or stern.

We would be glad to know the method, therefore, by which these berths are laid out, and would greatly appreciate any information you could give on this point. SHIP BUILDER.

Philadelphia,
June 20, 1910.

The author of the article supplies the following information:

When scaling by piece work was first undertaken the berths for the men were laid off by long battens and chalk lines run in. Later on, however, this was abandoned for it was found that for all practical purposes the following more simple method was satisfactory. For work on the outside hull, the staging tackles are hung 18 ft. apart starting at the bow, thus dividing the body of the ship into 18-ft. divisions. Each workman is given a section and all try to complete their sections down to the staging at about the same time in order that the whole staging may be lowered at once. As the time consumed in handling the staging comes out of the workmen's pockets it can readily be seen that it is to their advantage to have all lines ready to lower the staging together. Each man retains his section down to the keel. Whenever two workmen desire to work together in partnership and take the two adjacent sections, this is allowed, the earnings being divided. At 8 a. m. each day the work of the previous day is carefully measured up by means of a tape and the work that has been accomplished is lined off with blue paint. The date is placed in the space together with the workman's initials. In this way any of the work which fails to pass inspection can be readily traced to the proper workman.

On interior work the men nearly always work in pairs and divide their earnings so that there will be two men available to handle the staging.

PLANNING NEW TONNAGE.

Editor MARINE REVIEW:—The vessel owner who lets a contract for the construction of new tonnage without properly prepared plans is to be compared to the mariner who starts on a voyage without chart or compass. He may reach his contemplated destination, but it will be after circuitous wanderings and many anxious and expensive delays. As a study of, or a glance at the chart may show the navigator that his ultimate destination is not where he expected or possibly does not exist at all, so carefully prepared plans often develop hidden defects in proposed schemes that are in fact impracticable from a commercially successful point of view. Every new vessel should be an improvement on former ones, and it is the duty of the enterprising and painstaking consulting naval architect to profit by the experience of himself and others in what is already afloat, and thereby improve on his "ship on paper," eliminating all of the undesirable features of design and construction that he has knowledge of in former vessels.

In no manner or place is this so well done as on the drawing board in the drafting room. Working out ideas on steel hulls and on wood in cabins is an expensive operation, and it is so much easier and cheaper to draw and erase lines, and work out details on paper by the naval architect, than it is to employ gangs of fitters and platers, changing structural steel work, and joiners tearing down and changing woodwork after it has been erected, fitted and found unsatisfactory. A good set of plans shows the owner precisely what he wants, and enables him to get a close estimate on probable cost of vessel. They also show the intelligent artisan how to arrange the scantling and assemble the various component parts in the strongest and most economical manner, resulting in the maximum of strength with the minimum weight.

The naval architect in submitting a proposition to prospective vessel owners to make plans and specifications for their new tonnage, is frequently met with the remark that the builder or contractor will furnish the plans free. The owner who expects to save money on plans does not realize that although the builders maintain a permanent staff of draftsmen, that they are not in business for their health or pleasure and must meet that annual expense some way.

Their usual practice is to embody in the estimates before submitting bid for new work, a sum in amount equal to from 5 to 7 per cent of total cost of vessel for plans. But apart from the consideration of the owner paying the bill and not knowing it, there are certain distinct disadvantages which we will notice in order.

In the first place, he is paying more for the plans than he should, if he engaged a consulting naval architect, who would also superintend the work on his behalf. Further, the plans prepared in ship yards are got out by young men of little experience under the direction of the contractors' chief draftsman. The latter gentleman, though frequently a very competent man in his line, has to divide his time and attention to several different classes or designs of vessels under way at the same time and may not be posted on the complete and perfect requirements of any one of them. Whereas, the vessel owner's consulting naval architect makes a special study of the requirements of the trade and route of each vessel he designs, sometimes

taking trips on the route to note conditions and needs, locally and otherwise. Much slipshod and careless work is done by some builders when building to their own plans and unless duplicating a boat for an owner already well satisfied some of them cannot always be trusted.

A case could be cited where a vessel had to have $35,000 expended on her after one season's run, and had not met with an accident either. Her inefficiency was due to incompetent design in hull and working details; she was later sold after a few seasons' service for about one-third of her original cost. Still another vessel had to have expended on her one-third of her cost in changes during her second season; this was also due entirely to faulty design. Another case which must still be fresh in the memory of marine men is that in which a vessel owning firm sued the builders for over a quarter million dollars for defects due to the errors of the builders' chief hull draftsman.

We could cite nearly a dozen cases where vessels have gone into commission this year on the great lakes and have been the cause of annoyance, delay, expense and discussion, between the builders and owners, and in each and every case the trouble can be traced to faulty, incompetent or careless designing. A naval architect recently stated that he was kept busier by owners in changing and overhauling "botched" jobs on vessels, than in designing new tonnage.

W. J. W.

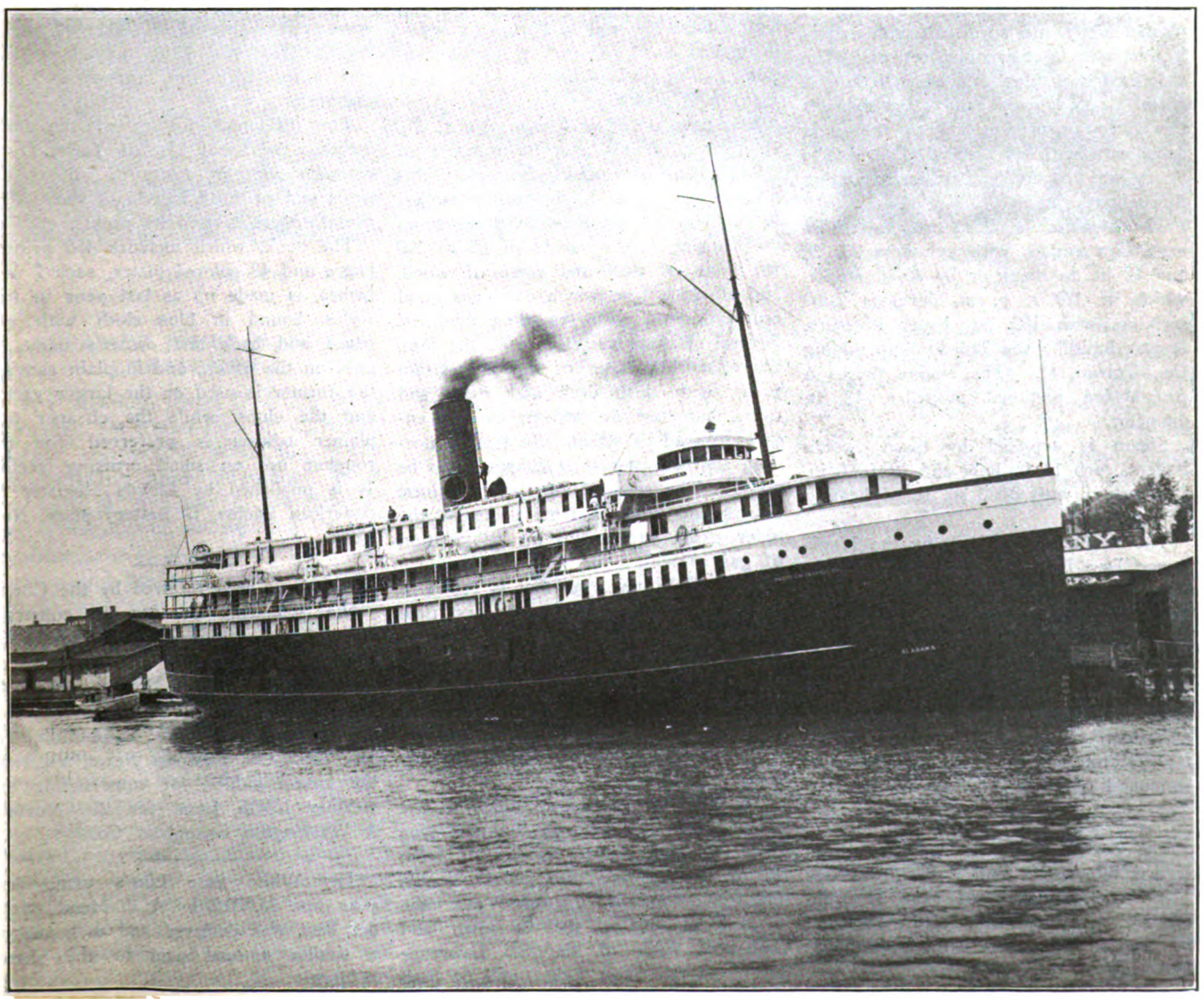
July 5, 1910.

Excursion On New Steamer Alabama

ABOUT 200 prominent business men from Chicago and vicinity were tendered an excursion on Lake Michigan as the guests of the Goodrich Transit Co., Wednesday afternoon, June 30. The event was in the nature of a "house warming" for the new steel steamer Alabama recently added to the Goodrich fleet. The steamer left her dock at the foot of Michigan avenue at 1:30 for a cruise in the lake and returned at 5:00 p. m. No attempt at a trial of speed was made, although one brief spurt was indulged in to show the visitors what the new boat could do.

Albert W. Goodrich, president of the Goodrich Transit Co., and H. W. Thorp, general manager, were the hosts of the occasion. Many prominent in marine and transportation circles on Lake Michigan were among the guests, as well as a number of well known business men from Chicago and representatives of the city government. Light refreshments were served. At the conclusion of the trip Messrs. Goodrich and Thorp were fairly overwhelmed with congratulations and toasts were proposed in honor of the good ship Alabama.

A complete description of the Alabama with drawings will be published in the August issue of THE MARINE REVIEW. The steamer is one of the most sumptuously and tastefully furnished vessels on the lakes. She was designed



THE GOODRICH TRANSIT CO.'S NEW STEAMER ALABAMA.

for the summer passenger trade on Lake Michigan and is admirably adapted to that purpose. At present she is operating on the night run between Chicago and Muskegon, Michigan.

Her hull is 271 ft. 6 in. in length over all, 44 ft. molded beam and 27 ft. in depth to the spar deck. The total depth from top deck to keel is 54 ft. Her loaded draught is 9 ft. 9 in. forward and 12 ft. 9 in. aft.

The Alabama is of the spar deck class with four decks as follows: A boat deck, promenade deck, cabin or spar deck and main deck, the two former of wood and the two latter of steel.

Provision is made for 272 passengers in 136 two-berth rooms. The excursion capacity is 1,500 passengers. Forward on the boat deck and just abaft the bridge are a number of parlors fitted with large brass beds, couches and furniture similar to that in the rooms of a first class hotel. A roomy bath room is attached to each parlor.

The smoking room and bar, on the boat deck aft, are finished in weathered oak with brown leather upholstery.

Aft on the spar deck is the social hall or main cabin, exquisitely finished in mahogany and furnished with roomy leather-bottom chairs and settees. The cafe is forward on this same deck. A grand stairway, wide and easy, connects the gangway opening on to the main deck aft, with the social hall. The floors are covered with cork matting throughout.

The steamer is fitted with a triple-expansion engine with cylinders 23, 38 and 62 in. in diameter by 36-in. stroke, which at 120 r. p. m. develops 2,200 i. h. p. with 180 lbs. boiler pressure. It was built by the Toledo Shipbuilding Co., Toledo, O. The engine drives a four-bladed sectional propeller, 12 ft. diameter.

Steam is supplied by three Scotch boilers, each 11 ft. long and 12 ft. 6 in. in diameter with 2,020 sq. ft. of heating surface.

The Alabama was built by the Manitowoc Dry Dock Co., Manitowoc, Wis., and everywhere throughout the vessel is evidence of careful design, thoughtful execution and tasteful finish. The finish and furnishings are rich, but do not descend to the gaudy barbarous gilt and ginger-bread work found on so many passenger vessels. Her normal speed is 17 statute miles per hour. She is in command of Capt. Edward Taylor.

The new 5,000-ton steamer Ruth, owned by A. H. Bull & Co., of New York, was launched on June 11 from the Newport News ship yard. She will be used in trade between both Atlantic and Gulf of Mexico ports.

LLOYDS REGISTER OF AMERICAN YACHTS FOR 1910.

The American Yacht Register, which makes its appearance for the eighth successive year, is unchanged in exterior from last year, but an inspection of its various departments discloses good grounds for the claim of the publishers that it is necessary to make the book entirely anew every year. The changes in the 3,500 entries of the Yacht List proper show a complete reorganization of the American pleasure fleet on a new basis; the gasoline engine displacing rope and canvas more rapidly than in any previous year.

With but three new additions to the sailing fleet, A. S. Cochran's big schooner Westward, Harold S. Vanderbilt's small schooner Vagrants and Morton F. Plant's 53-ft. cutter Shimna, there are to be noted such omissions as the famous cup-defenders Volunteer and Vigilant, sold for commercial service, the well-known schooner Thistle, sold to a foreign owner, a number of the less noted schooners and cutters, sold out of yachting or broken up. Of those of the older and larger still left, the great majority are now auxiliaries. The additions to the sailing fleet are so few in number as to call for no special mention, mostly racing boats of not over 35-ft. load waterline.

The new auxiliary barque Aloha, 218 ft. over all, with a gross tonnage of 659, stands alone among the new yachts of the year; next in importance to her in the way of additions to the list are the cruising power yachts of 80 to 100 ft., some of steel and some of wood, and all of a type which combines good cruising speed with sea-going qualities. Several of these vessels are of the familiar American type of coasting steam yacht, with flush deck and stack and spars, but they are driven by gas engines instead of steam. In this connection, another interesting change is to be noted: The removal of steam engines, boilers and bunkers from some of the older steam yachts and the substitution of gas engines.

An entirely new type that is found in the *Register* this year for the first time is the ocean cruiser of about 60 ft. length, the product of the long distance races of recent years to Bermuda and Havana. This type is represented by the Caliph, Berneyo, Loantaka; all new this year and specially designed for this service.

The most numerous additions to the Yacht List are found in the new type of raised-deck power cruisers of from 30 to 60 ft. over all; geographically, these additions are scattered over the whole country, on the Canadian and American sides of the St. Lawrence river and the Great Lakes, and on both borders of Puget Sound; further down on the Pacific coast; on the Gulf of Mexico, Houston, for instance, boasting a very fine fleet of new cruisers, and, of course, in the older yachting waters of the east. The smaller craft of this type are also found in great numbers on the inland waters of the middle west.

Of purely racing types the majority are found in such small sailing yachts as the Sonder-class and the Seawanhaka cup class, and in the 40-ft. class of full-powered launches. The well known yachts that will be missed from the *Register* this year are W. K. Vanderbilt's Valiant and A. J. Drexel's Margarita, both sold to foreign ownership.

One notable feature is the increase in the number of clubs, the total being 458, as compared with the 159 clubs in the 1905 *Register.* This increase is made up in part of the conventional yacht clubs, but largely of clubs specially devoted to power yachting, the membership being composed of new recruits to the great American pleasure navy. The increase is confined to no one locality, it is marked in the inland and lake waters of Canada, as well as on both fresh and salt water in the States. The commercial value of this side of yachting, as represented in engine building and allied industries, cannot be estimated.

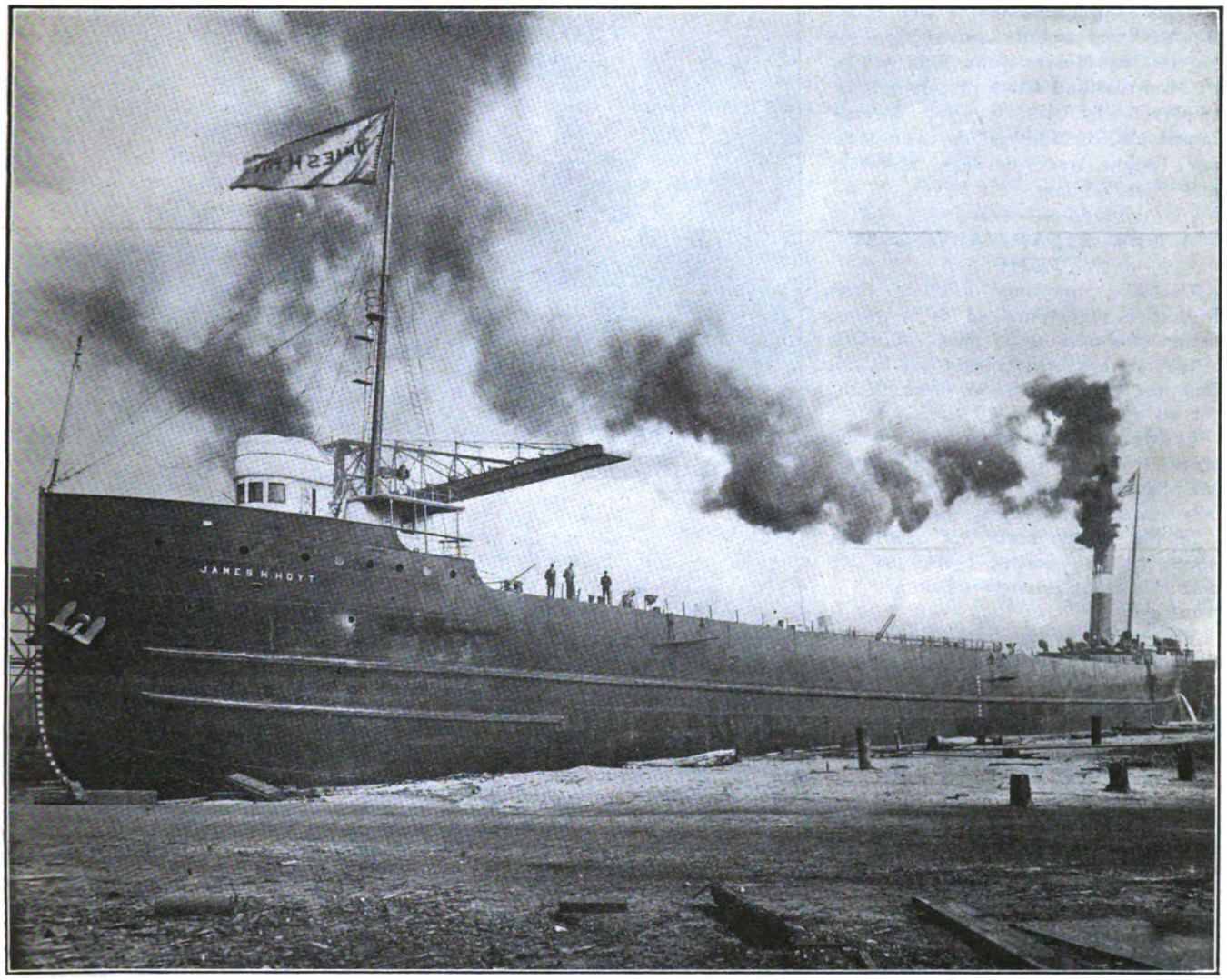
The incidental feature of the book includes the usual List of Yacht Owners, the flags in colors of all of the clubs and of 2,047 individual yachtsmen, signal letters carried by yachts, etc.

The book, which includes 456 printed pages and 48 colored plates, each 7 x 9 inches, is made up as last year in two styles, bound in blue cloth with gilt edges and back and owner's name in gold on the cover; and in plain canvas; the former is used on the larger yachts and the clubs, while the cheaper and plainer edition is preferred for the rougher use on small cruising yachts. It is published by Lloyds Register of American Yachts, 17 Battery place, New York.

Bids have been received by the Chesapeake Steamship Co. for the construction of two steamers to be known as the City of Baltimore and the City of Norfolk, to be 310 ft. long over all, 46 ft. beam.

The Newport News Shipbuilding & Dry Dock Co., Newport News, Va., was the lowest bidder for constructing the steamer North Land for the Norfolk & Washington Steamboat Co.

The White Star Line's profit last year was $3,070,270. A dividend of 10 per cent was declared and a bonus of a similar amount paid to the shareholders.



THE STEAMER JAMES H. HOYT, LEAVING THE SUPERIOR SHIP YARD AFTER BEING LENGTHENED.

STEAMER JAMES H. HOYT LENGTHENED.

The steamer James H. Hoyt, which stranded on Outer Island, Lake Superior, last fall, is practically a new ship, having been lengthened 48 ft. as well as undergoing complete interior rebuilding, substituting the arch construction in place of the main deck beams and hold stanchions. The sheer strake and spar deck were strengthened by putting a doubling plate two-thirds the length of the ship. Seventy-six plates were taken off the bottom and about 175 bottom frames were cut and straightened. The whole tank top was also taken off, rerolled and put back. The tank top stiffeners were reinforced with plate. The intermediate stiffeners were also reinforced to resist the abuse which the tank top receives from the unloading machines. Considerable repairs were also made to the machinery and boilers on account of the stranding, and altogether the James H. Hoyt, the first vessel on the lakes to be constructed with hatches spaced 12 ft. centers, is a new ship.

SAN JUAN NAVIGATION CO.

The San Juan Navigation Co., the newly organized steamship company, has inaugurated the first daylight service from Seattle to the San Juan Islands in upper Puget Sound. The company has purchased the Burton from the Kitsap County Transportation Co., and will run her under the command of Capt. Chas. Basford, formerly master of the Islander. A long charter has been taken on the steamer Vashonian, owned by the Vashon Steamship Co., the Vashonian being in command of Capt. E. B. Jackson, formerly of the Kitsap County Transportation Co. The new company has been organized to meet the demand for a transportation concern to handle the mail contract in the San Juan Islands. George V. Hind, of Hind, Ralph & Co., the San Francisco shipping concern, is president of the new company; A. E. Black is vice president; and C. G. Coker, of the Diamond Coal Co. is general manager. The Burton will run from Bellingham to the San Juan Islands and return, while the Vashonian will make all points between Seattle and East Sound, connecting with the Burton at Friday Harbor.

NEW STEAMER C. A. JAQUES.

The new St. Lawrence and Upper Lake package freighter C. A. Jaques, arrived at Montreal on Sunday, May 26, after a remarkably short passage from the Clyde of 12½ days. This vessel is one of the most up-to-date of the Canadian canal type of freighter of the usual lock dimensions with deep 'tween decks, gangway doors, and friction shafting for rapid handling of cargo. She is fitted with triple-expansion engines with cylinders 18, 28, 46 by 33 in. stroke, and two Scotch boilers fitted with forced draft

on the Howden system. The vessel was designed and its construction supervised by Messrs. John Reid & Co., of Montreal and Glasgow. It will be employed by its owners, Messrs. Jaques Co., of Montreal, in their package freight trade between Montreal and Fort William.

A NEW STEAM-VALVE-LESS PUMP.

The line engravings herewith show in section the steam end of a unique design of duplex steam pump, of which a full line has been brought out by the Manistee Iron Works, Manistee, Mich., for all purposes.

In this design, steam valves and stems, rockers, links and all other gear are dispensed with, the steam pistons only remaining as moving parts.

In Fig. 1, the ports *AA* are steam ports; *CC* are exhaust ports, and *BB* and *DD* are alternately steam and exhaust ports.

The cylinders are cast together and the ports are V-shaped in section so as to give in effect a graduated opening as they are uncovered by the pistons.

Fig. 1 shows the pistons in four different positions and it will be evident on inspection that the pistons must complete their strokes before the ports can change from steam to exhaust and *vice versa*.

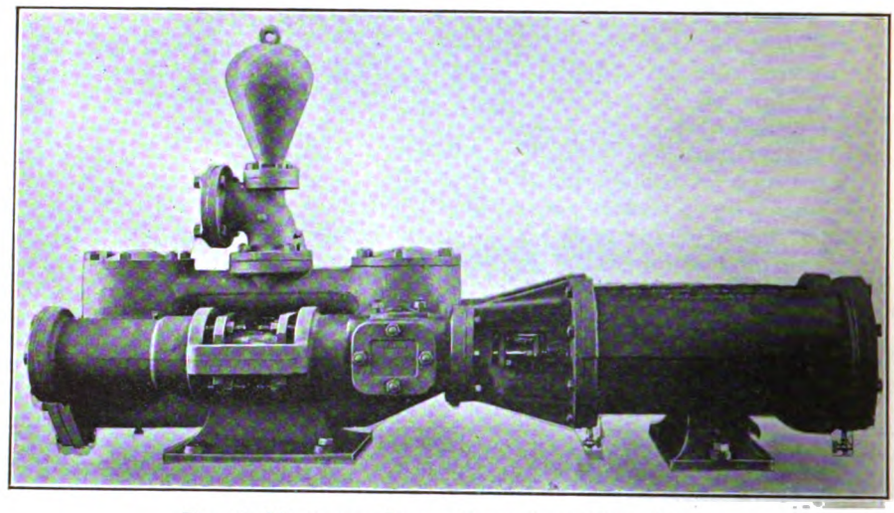


FIG. 2—MANISTEE STEAM-VALVE-LESS FEED PUMP.

This, together with the system of partial two-stage, or compound, working effectually prevents running away and this feature of full stroke and safe speed, regardless of losing suction, ought to be particularly valuable on water ballast work where the ordinary duplex invariably fails, as the "drying out" period approaches.

The elimination of outside working parts requiring lubrication or protection also makes possible distant or exposed installations, or the pump may be entirely enclosed. There is manifestly no opportunity for arrangement, since there is nothing which can be altered nor mis-adjusted and so far as the steam end is concerned, so long as the pistons are in working order, the pump must continue to operate.

Fig. 2 shows an outside center-packed pump of the 8 x 5 x 10-in. size, as made for marine use for boiler feeding and fire service.

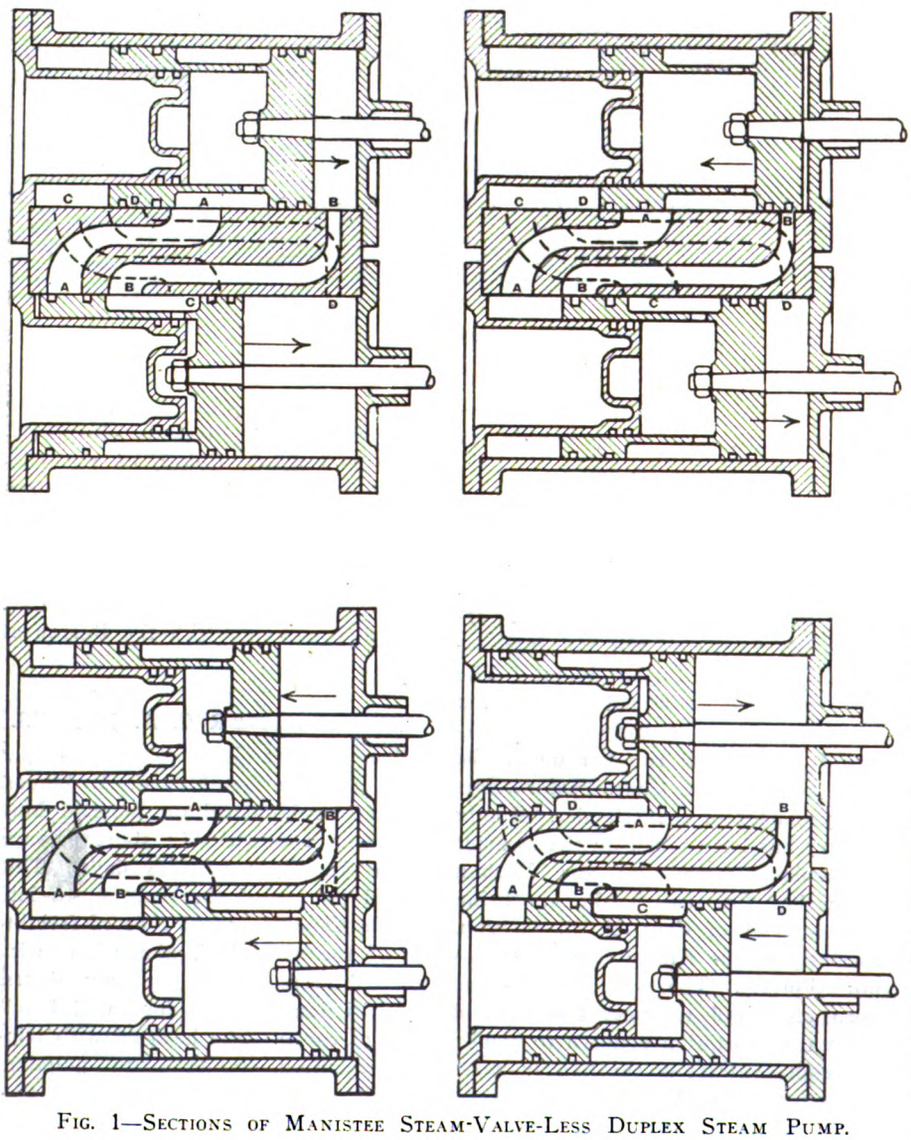


FIG. 1—SECTIONS OF MANISTEE STEAM-VALVE-LESS DUPLEX STEAM PUMP.

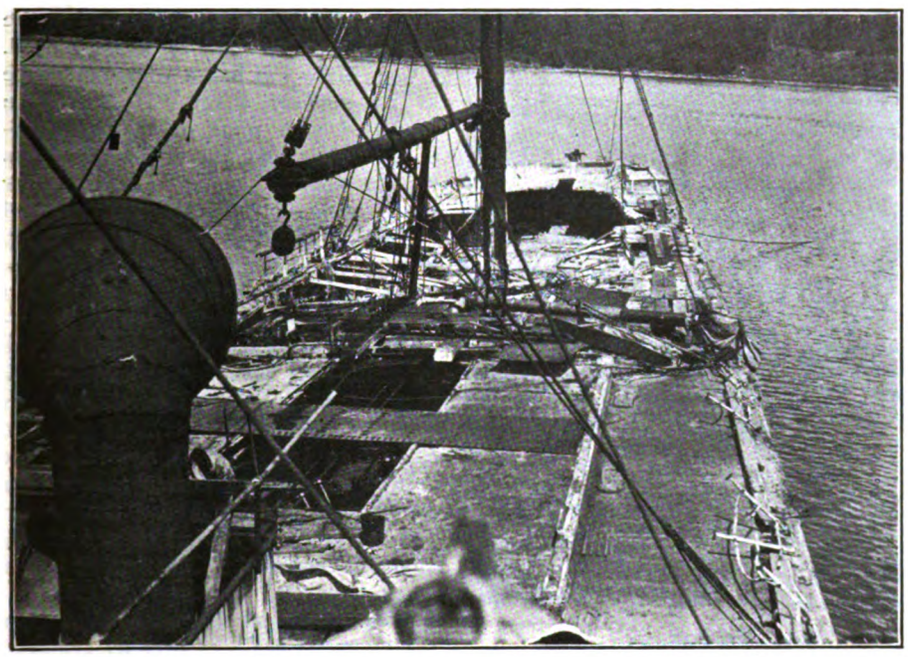
OBITUARY.

Frederick Rehbaum, a well known marine engineer, died at his home in Buffalo on July 5. He had been with the Anchor Line for many years, and was chief engineer of the Wissahickon.

Gen. James A. Dumont, who was for 27 years connected with the Steamboat Inspection Service, died on June 14 at the home of his son in Rochester, N. Y. He was 86 years old and his illness was the first which ever confined him to bed. He held the position of supervising inspector general of the Steamboat Inspection Service for 25 years, retiring from that position to become inspector of hulls of steam vessels for the New York district. He retired from service in 1904.

Salving the Yucatan

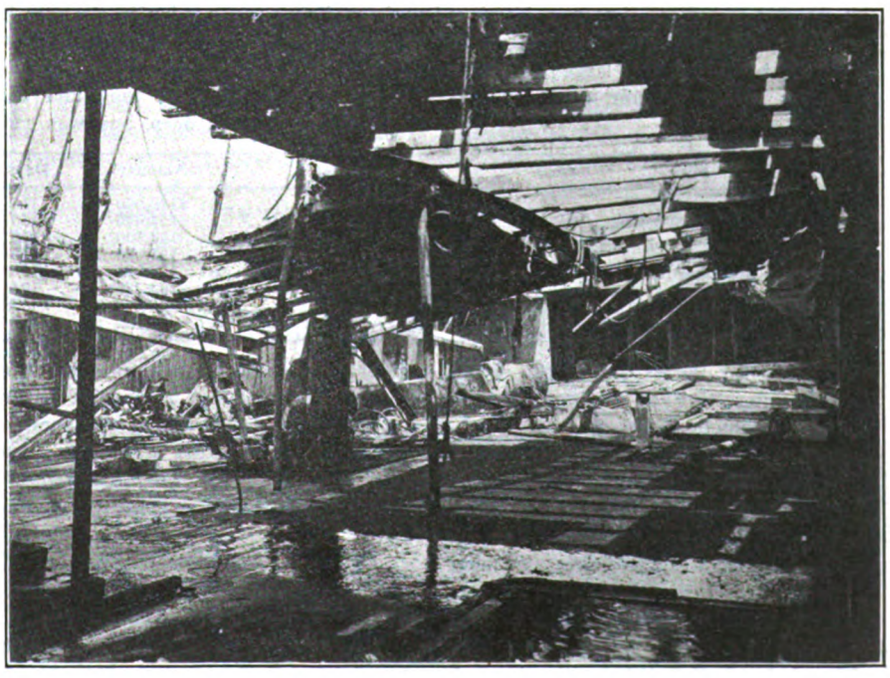
THE Yucatan, a 336-ft. steel steamer of the Alaska Steamship Co.'s fleet, wrecked in Icy Strait, off the coast of Alaska, on Feb. 16, has been successfully raised after one of the most exceptional cases of salving known in the history of the Pacific coast. The Yucatan struck a floating iceberg in Icy Strait and was put ashore at Goose Bay, where she lay submerged to her boat deck for three months, and was completely gutted by icebergs floating over her. When the Alaska Steamship Co. turned over the wreck to the underwriters, the Puget Sound Salvage Co. began preparations to raise the vessel. The salvage steamer Santa Cruz left Seattle early in February and reached the wreck of the Yucatan on Feb. 19. The vessel lay with a three-degree list to port with water covering her to the bridge forward, and heavy pack ice over the after part. The Santa Cruz was unable to get alongside because of ice, but boat crews dodged in and out whenever the ice receded with the tide sufficiently to give them an opportunity to work. It was not until March 7, that the Santa Cruz, with her wrecking gear and big pumps could be brought alongside. Then the ice completely covered the after part of the vessel, the deckhouses having been carried away and everything swept clean to the house under the bridge on the forward promenade deck. The stern was stove in and the deck frames crushed out of shape by the ice, the surging of which soon gutted the after part of the vessel from the engine room casing aft until only the shell and the wreckage of the broken ends of the deck frames remained. For two weeks the salvors dodged in alongside the wreck when the tide carried away the floes for a little space, working for an hour or two and then hurrying back to Gull Cove, where the Santa Cruz went to shelter.



S. S. YUCATAN, LOOKING AFT, SHOWING DECK AND SIDES CRUSHED AND BROKEN.

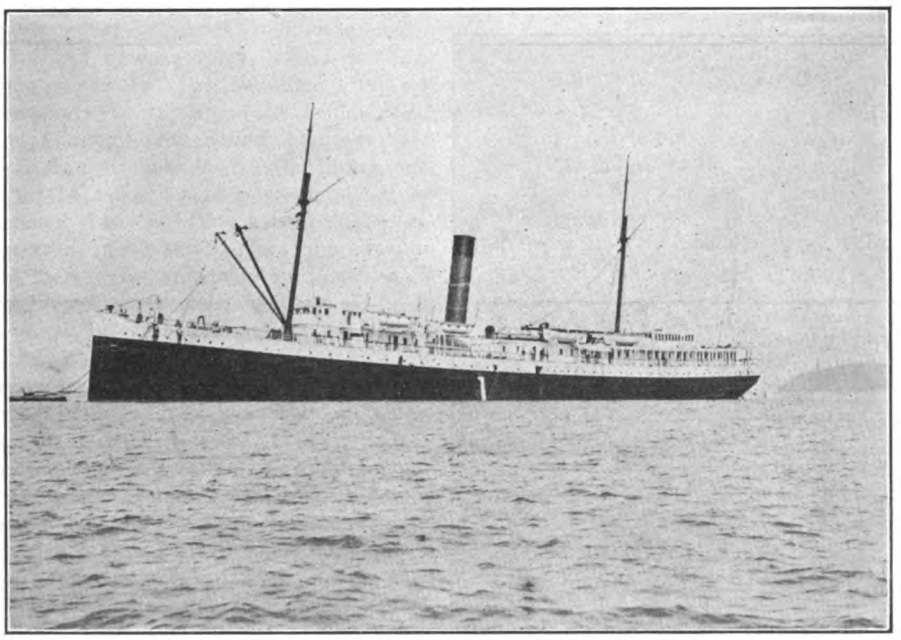
Three divers went down from the steamer's boats, and had some narrow escapes. Often floating ice bore down against the boats carrying the air pumps, and signals were frequently sent to the divers urging haste because of ice threatening to interrupt the air supply. During March and the earlier part of April, the divers worked under the ice alongside while boats were kept busy in the effort to keep off floating ice.

The hole caused by striking ice and which necessitated beaching the steamer was but a small rupture about 1 x 3 ft. on the port bow, but the vessel was badly holed in beaching. There were bad ruptures under the engine room and in the after hold, and through one of the latter penetrated a ledge of rock. In order to get a patch over this wound, it was necessary to blast the rock away. Four cases of dynamite were used in this, the drilling being done by divers 35 ft. below the surface. This was arduous and slow work, but ultimately a steel patch was made fast. Hole after hole was repaired, and a big wooden pad, 9 x 14 ft., was made fast to the damaged hull, and then the pumps were started. Five 10-in. pumps were soon at work, throwing 3,000 tons of water an hour. When the steamer lifted, it was found that the patches were not satisfactory and she was allowed to sink again. On May 15, the pumps were again all started and the wreck lifted and taken to Mud Bay, and soon afterward to Hoonah, where temporary repairs were effected to allow of the voyage south which, with the assistance of the tug William Joliffe and the Santa Cruz, was made without incident, and the Yucatan was placed on the British Columbia Marine Railway Co.'s dry dock at Esquimalt.



BELOW DECK, SHOWING DAMAGE DONE BY ICEBERGS WHILE THE YUCATAN WAS LYING UNDER WATER IN ICY STRAIT.

The salvage of the Yucatan was accomplished by Capt. J. E. Pharo and his wrecking crew after nearly four months of difficult and disagreeable work, hindered constantly by icebergs, which also endangered the lives of the divers and salvage crew. The salvage company contracted to raise the Yucatan on a "no float, no pay" basis, $35,000 to be paid on delivery of the wreck.



S. S. YUCATAN BEFORE SHE WAS WRECKED.

On docking, it was found that 30 plates in the bottom and aft were damaged and must be replaced. About 30 ft. of the forefoot was carried away and the upper deck aft was badly damaged, as already noted. The boilers and machinery were intact. Tenders for the repair of the Yucatan were submitted by all of the large shipbuilding firms on the Pacific coast as follows:

Firm.	Place.	Amount.	Days.
Union Iron Works	San Francisco	$170,000	175
United Engineering Works	San Francisco	153,000	150
Moore Iron Works	San Francisco	122,500	150
B. C. Marine Ry. Co.	Victoria	125,000	130
Moran Ship Building Co.	Seattle	120,000	150
Wallace & Jenkins	Seattle	133,250	125
Hefferman Ship Building Co.	Seattle	119,460	7 mos.
Willamette Steel & Iron Works	Portland	89,000	140

The bids for the repair of the Yucatan are interesting as the lowest, that of the Willamette Steel & Iron Works is over $20,000 lower than the next higher bidder and less than one-half that of the highest bidder. The effect of the eight-hour day is apparent in the bids of the San Francisco firms, as labor makes the cost of ship repairing there the highest of any port on the Pacific coast.

The bid of the Willamette Iron & Steel Works will probably be accepted and after temporary repairs have been made at Esquimalt, the Yucatan will be taken to Portland for permanent repairs.

The insurance on the Yucatan was about $250,000, of which $75,000 is on disbursements. With a salvage item of $35,000 and $89,000 for repairs and incidental charges with new equipment at some $60,000 and a credit item of some $16,000 on old insurance, the underwriters save some $16,000.

The salving of the Yucatan is regarded by shipping men as one of the most difficult pieces of work that has been accomplished in this line on the Pacific coast in a long time. The Yucatan is a steamer of 3,535 tons gross, 2,317 tons registered tonnage, similar to the Northwestern, which was salved by the British Columbia Salvage Co. from Latouche Island. She is 336.5 ft. long and 43.2 ft. beam and 22.3 ft. deep, and was converted into a private yacht in the spring of 1909 and used for a pleasure excursion through Alaska during the summer by George W. Perkins and party from New York. In the fall of 1909, she was reconverted into a passenger steamship.

THE NEW CHIEF OF ENGINEERS, U. S. ARMY.

As interest is increasing in the improvement of rivers and harbors, so interest is being awakened in the man who directs the work. Only a few years ago, little attention was paid to the office of Chief of Engineers, although millions of dollars were expended annually under the direction of its chief. It is doubtful if half the inland navigators knew the name of the man who took final action on the pleas for the improvements which benefited them. On June 11, Gen. W. L. Marshall surrendered the reins of Chief of Engineers to Gen. William H. Bixby, a man particularly well fitted for the office—few officers are so well equipped.

Gen. Bixby has had a wide experience as an engineer officer. He has been connected with some of the most important river and harbor improvements in this country and has seen similar improvements in Europe. He has had charge of work on the Atlantic coast, having been stationed at Wilmington, N. C., and at Newport, R. I. He is, no doubt, better informed on the improvements of the Ohio river from source to mouth than any other engineer officer in the service today. Gen. Bixby was connected with the Ohio river from Oct. 6, 1897, to Jan. 15, 1902, and has since been a member of boards to consider proposed improvements for that river. For several years he had charge of the improvements of the Ohio for its entire length and also of many of its tributaries. He made frequent trips over the river and has been over its principal tributaries, so that he knows the conditions first hand. He is also well acquainted with the conditions on the Great Lakes, having been stationed at Detroit and Chicago. Gen. Bixby will, no doubt, be welcomed as Chief of Engineers by most of the lake navigators, because he is familiar with their needs. His last work in the field was on the Mississippi, he having been president of the Mississippi River Commission.

Gen. Bixby was selected as the engineer expert and accompanied the special congressional commission on an inspection tour of the principal waterways of Europe. Some years ago, he was representative of the United States Army to the French Army maneuvers.

As will be seen from the above, Gen. Bixby is particularly well fitted by experience for the office of Chief of Engineers. But more than that, he is a man of liberal ideas; he is progressive; he is quick to discern and appreciates good work. He wants details.

The British admiralty have placed a contract with Messrs. Yarrow & Co., of Glasgow, for two torpedo boat destroyers of a special type, involving many new features. In these vessels the constructors have been allowed to have a perfectly free hand in the design of the machinery, and consequently the trials of these destroyers will be awaited with considerable interest.

Trials of the Brazilian Battleship Sao Paulo

THE trials of the new battleship Sao Paulo, built by Messrs. Vickers, Son & Maxim, Ltd., Barrow-in-Furness, for the Brazilian Navy, have just been carried out with the most satisfactory results. She is a sister ship to the Minas Geraes, recently completed by Messrs. Armstrong, Whitworth & Co. The ships are alike in design, and the two firms have succeeded in meeting the strategical and tactical needs with a large measure of success, as was clearly established during the trials. Notwithstanding that the draught of these vessels is limited, owing to the depth of water in South American waters, to 25 ft., a high fighting efficiency has been achieved.

The ships have twelve 12-in. guns so disposed that eight can be fired ahead, eight astern, or ten on either beam. In addition, there are twenty-two 4.7-in. guns and eight 3-pounders.

Secondly, the broadside is protected right fore and aft; the thickness is 9 in. in the center part for the full depth of 22 ft. 4 in., including 5 ft. below the load water line. This thickness is reduced to 6 in. forward and aft, and ultimately to 4 in. at the bow and stern; 9-in. athwartship bulkheads are located forward and aft at the ends of the 9-in. armor and protection against raking fire, while at the bow there is a 3-in. bulkhead, and at the stern a 4-in. bulkhead.

TABLE I.—MEAN RESULTS OF ALL TRIALS.

	48 Hours' Coal Consumption Trial.		30 Hours' Trial.		8 Hours' Trial.		Six Full-Speed Mile Runs, 250 lb. Boiler Pressure.	Two-Mile Runs, 280 lb. Boiler Pressure.
	Whole Trial.	Mile Runs.	Whole Trial.	Mile Runs.	Whole Trial.	Mile Runs.		
Date	May 21, 22, 23, 1910		May 24, 25, 1910		May 28, 1910		May 30, 1910	
Draught, forward	25 ft. 2 in.		25 ft.		24 ft. 5½ in.		24 ft. 8 in.	
Draught, aft	25 ft. 5¾ in.		25 ft. 3½ in.		25 ft. 1⅛ in.		24 ft. 10 in.	
Draught, mean	25 ft. 3⅞ in.		25 ft. 1¾ in.		24 ft. 9¼ in.		24 ft. 9 in.	
Displacement	19,645		19,460		19,133		19,110	
Mean i. h. p.	2,403	2,383	16,067	17,377	21,484	22,355	25,517	28,645
Mean revolutions	67.15	67.52	127	129.8	138.7	140.85	145.59	150.85
Mean speed ..... knots	.....	10.61	.....	19.853	.....	20.99	21.231	21.623
Boilers in use	5	5	18	18	18	18	18	18
Coal consumption, lb. per i. h. p.	1.8	.....	.....	.....	1.42	.....	.....	.....

Brazilian ships are larger and heavier for a given power, but there is gain in greater reliability under the conditions of South American service. Reciprocating engines have been adopted and have proved of high efficiency, the radius of action, according to the results of the Sao Paulo trials, being 29 per cent greater than that guaranteed—or 12,913 nautical miles instead of 10,000 at 10 knots. The full speed on trial—21.623 knots—was realized with 28,645 i. h. p., while the guarantee was for 21 knots. On a trial of about four hours' duration, during which six runs were made over the measured mile, a speed of 21¼ knots was attained with 25,517 i. h. p. On an eight hours' trial a speed of 20.99 knots was got with 22,355 i. h. p., the guarantee being 20 knots.

There is thus the important advantage of a reliable high speed as well as a wide radius of action, added to offensive and defensive qualities of a high order, with a draught of only 25 ft., whereas in many of the later foreign Dreadnought ships the design is for draughts ranging up to 29 ft. and 30 ft. It is obvious that, especially in South American waters, the Brazilian ships must

Heating surface .....
Grate area .....

The trials of the Sao Paulo were commenced on May 21, with a 48-hour

was 21,484 i. h. p., while the coal consumption was only 1.42 lbs. and the

TABLE III.—RESULTS OF MEASURED-MILE TRIALS.

No. of Run.	Revolutions per minute. Starboard.	Revolutions per minute. Port.	Speed, Knots.	Indicated horsepower. Starboard.	Indicated horsepower. Port.	Indicated horsepower. Total i. h. p.
SIX RUNS AT FULL POWER, FOR 1,000 FT. PISTON SPEED, ½-IN. AIR PRESSURE, 250 LB. STEAM PRESSURE.						
1	140.9	139.5	20.571	11,234	10,840	22,074
2	141.2	139.1	21.352	11,360	10,876	22,236
3	141.4	140.9	20.477	11,353	11,114	22,467
4	141.5	142.2	21.505	11,223	11,628	22,851
5	140.5	141.3	20.618	10,974	11,440	22,414
6	140.5	141.2	21.453	10,762	11,330	22,092
Means	141.0	140.7	Mean of means 20.99	11,151	11,204	22,355
	— 140.85 —					
SIX RUNS AT FULL SPEED WITH 250 LB. STEAM PRESSURE.						
1	145.8	145.5	21.617	12,631	12,828	25,459
2	143.3	142.6	20.979	12,039	13,404	25,443
3	144.8	144.5	21.302	12,393	12,542	24,935
4	148.0	145.9	21.052	13,027	12,712	25,739
5	146.3	147.1	21.686	12,913	12,992	25,905
6	147.5	145.8	20.93	13,038	12,586	25,624
Means	145.95	145.23	Mean of means speed 21.231	12,673	12,844	25,517
	— 145.59 —					
TWO RUNS AT FULL PRESSURE (280 LB.).						
1	152.8	151.4	21.428	15,301	14,648	29,949
2	149.8	149.4	21.818	13,593	13,749	27,342
Means	151.3	150.4	Mean of means 21.623	14,447	14,198	28,645
	— 150.85 —					

water loss 2.2 tons per 1,000 i. h. p. per 24 hours.

On the measured mile trials six runs were made in alternate direction so that the influence of tide was balanced, while the boiler pressure was not to exceed 250 lbs. There was no limit for revolutions or air pressure. In table III, the results are also given for these six runs.

The gunnery trials proved equally satisfactory, a complete broadside of eleven 4.7-in. guns being fired simultaneously with a broadside of ten 12-in. guns, so that a record in the way of broadsides was established. Admiral Bacellar fired this tremendous broadside, and everyone of the 21 guns responded.

THE YEAR'S SHIPBUILDING.

During the year ended June 30, 1910, there were built in the United States and officially numbered by the Bureau of Navigation 1,502 merchant vessels of 347,025 gross tons, compared with 1,362 of 232,816 gross tons during the fiscal year of 1909, showing a substantial increase of 114,209 tons.

On the Great Lakes 47 steel steamers of 146,896 tons were built, compared with 36 steamers of 88,426 tons during last year.

Fifteen new steel ocean steamers were launched, the largest of which was the Wilhelmina, of 6,974 tons. The schooner Wyoming, 3,730 tons, built at Bath, Me., is the largest wooden vessel ever built in the United States. The first square-rigged vessel launched since 1904 is the brigantine Viola, at Essex, Mass. Of the year's output 67,268 tons were barges and canal boats.

Following is the table:

	Wood.				Steel.					
	Sail.		Steam.		Sail.		Steam.		Total.	
	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.
Atlantic and Gulf...	111	15,355	389	11,877	7	3,954	44	82,333	551	113,519
Porto Rico	6	38	2	18	..	.....	1	92	9	148
Pacific	9	1,758	238	6.887	1	32	7	3 165	255	11.842
Great Lakes	..	.....	152	3,177	..	.....	47	146,896	199	150,073
Western rivers	1	8	150	4,044	..	.....	4	123	155	4,175
Total	127	17,159	931	26,003	8	3,986	103	232,609	1,169	279 757

During the corresponding year ended June 30, 1909, 1 072 sail and steam vesse's of 171,864 gross tons were built in the United States and officially numbered, as follows:

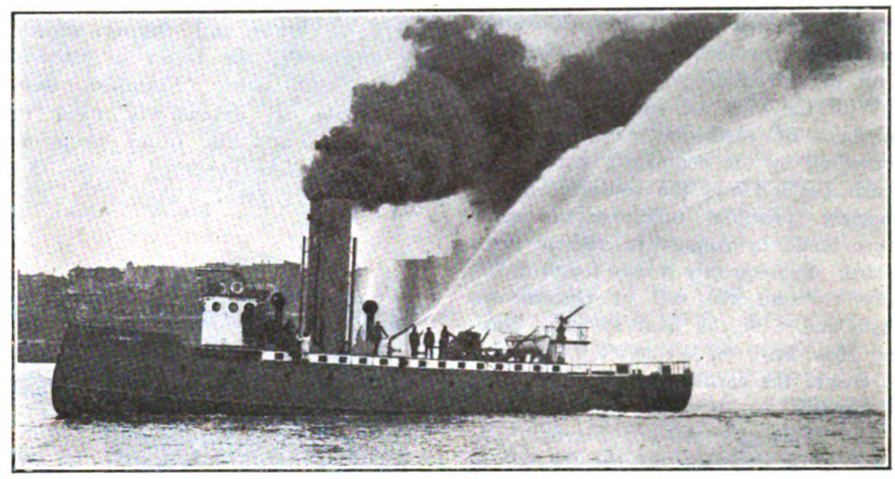
	Wood.				Ste l.					
	Sail.		Steam.		Sail.		Steam.		Total.	
	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.
Atlantic and Gulf...	108	18,835	395	9,781	8	7.472	23	28 613	534	64,701
Porto Rico	7	79	...	.....	..	.....	..	.....	7	79
Pacific	17	287	204	11,533	..	.....	1	499	222	12,319
Great Lakes	...	.....	99	1,644	1	513	36	88 426	136	90 583
Western rivers	...	.....	167	3,762	..	.....	6	420	173	4,182
Total	132	19,201	865	26,720	9	7.985	66	117,958	1.072	171 864

COMPARATIVE STATEMENT.

1910.	No.	Tons.	1909.	No.	Tons.
Sail and steam	1,169	279 757	Sail and steam	1,072	171 864
Unrigged	333	67,268	Unrigged	290	60 952
Total	1,502	347,025	Total	1 362	232.816

DUWAMISH MAKES GOOD.

The new Seattle fireboat, Duwamish was launched and put into service in February, 1910. On May 18, she was sent out for a private trial by the fire department crew. The photograph shows one 2/4-in., three 2-in. and three 11/2-in. nozzles working, using in all 9.300 gallons of water per minute. On May 20 the Duwamish had her first fire call to the plant of the Independent Asphalt Co., but June 10 brought the first real fire fighting. The Duwamish worked her monitors for 40 minutes and pumped all night through hose connections in quelling the conflagration in the north and waterfront of Seattle. The Duwamish handles well, develops a speed of 15 miles an hour and is proving satisfactory in every respect in protecting Seattle's 20 miles of waterfront.



NEW SEATTLE FIREBOAT DUWAMISH IN ACTION, MAY 18, ON HER TRIAL TRIP.

CUNARD STEAMSHIP CO.'S REPORT.

The following financial report of the board of directors of the Cunard Steamship Co. for 1909 is commended as a model of lucidity and brevity. It omits no detail of importance:

The accounts, which have been duly certified by the auditors, show that the profits for the year, including £3,582 6s 8d brought forward from 1908, amount to £664,002 12s 9d. After debiting income tax and interest, reserving £376,483 18s 0d for depreciation of ships and wharf properties, and transferring £66,598 9s 8d to the insurance fund in settlement of claims and expenses for the year, there remains at the credit of profit and loss account, £86,988 3s 9d. The directors regret that they are unable to recommend the payment of a dividend as they consider that their first duty is to strengthen the company's reserves; they have, therefore, transferred £80,000 to the reserve fund, leaving a balance of £6,988 3s 9d, which is carried forward to the credit of profit and loss account, 1910.

The balance at the credit of insurance fund stands at £400,000, and the reserve fund has been increased to £230,000.

There has been paid during the year £130,000 to the sinking fund for the redemption of the stock established under the government agreement.

The balance of the £1,600,000 4½ per cent mortgage debenture stock created during 1908, amounting to £800,000, has been issued.

The company's passenger business during 1909 showed a decided improvement over that of the previous year. Emigration to the United States increased considerably, but this was offset to some extent by the fact that the eastbound third class traffic was sensibly less than in 1908—that year having been abnormal. It is satisfactory to report that

the lines engaged in the New York-Mediterranean business were able during the year to compose their differences, and third class passenger rates in this trade have, therefore, been restored to a normal level.

American freights westbound were maintained, but eastbound remained disappointing.

The Lusitania and Mauretania continued to give evidence of great popularity with the travelling public.

With the view of enabling the large numbers of eastbound passengers now travelling by the company's steamers to reach London and the continent in the shortest possible time, arrangements were made in August to call at Fishguard. Subsequently it was found necessary to omit the call at Queenstown eastbound with the mail steamers leaving New York on Wednesdays, in order to ensure the earliest possible arrival at Fishguard.

The company's steamer Slavonia unfortunately stranded on the Island of Flores, one of the Azores, in June last, whilst on a voyage from New York to the Mediterranean, and subsequently became a total loss. The vessel was insured for part of her value, and the balance of the loss has been written off.

In consequence of a fire breaking out on the Lucania whilst in dock at Liverpool in August, the steamer was so considerably damaged that it was necessary to abandon her to the underwriters as a constructive total loss. The Lucania was insured for the full value at which she stood in the company's books.

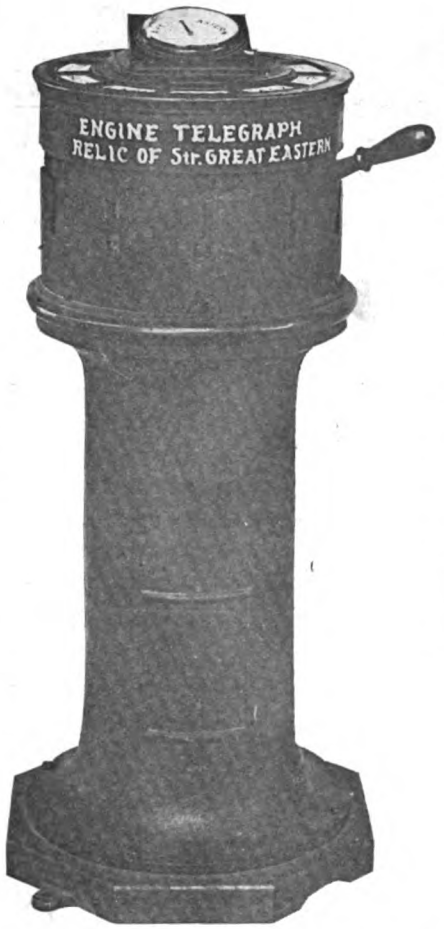
The steamers Etruria, Aleppo, Cherbourg and Saragossa, being no longer suitable for the trades in which they were employed, have been sold. To maintain the Liverpool-Mediterranean cargo service, the company have purchased three suitable steamers, which have been re-named Phrygia, Thracia and Lycia.

A contract has been placed with Messrs. Swan, Hunter & Wigham Richardson, Ltd., for the building of a new steamer (the Franconia) of 18,000 tons gross, which is intended to be employed in the Boston trade and the trade between the United States and Mediterranean ports. It is anticipated that she will be delivered in the beginning of the year 1911.

MARINE EXHIBITS AT DETROIT INDUSTRIAL EXPOSITION.

Among the exhibits at the Detroit Industrial Exposition, June 20 to July 6, were several of interest to ship builders and owners. The American Blower Co. had a very complete exhibit, including blowers, direct connected to a generator. The ventilating system included an air-washing equipment, such as is now frequently installed in large buildings and passenger ships.

The Chicago Pneumatic Tool Co. exhibited a line of pneumatic drills, chipping and riveting hammers, cleaners, etc. The Detroit Copper & Brass Rolling Mills displayed a large variety of brass and copper sheets, wire and rods, the latter in various sections and sizes. Seamless steel tubes, now so extensively used in boiler work and for other purposes aboard ship, were exhibited by the Detroit Seamless Steel Tubes Co. The



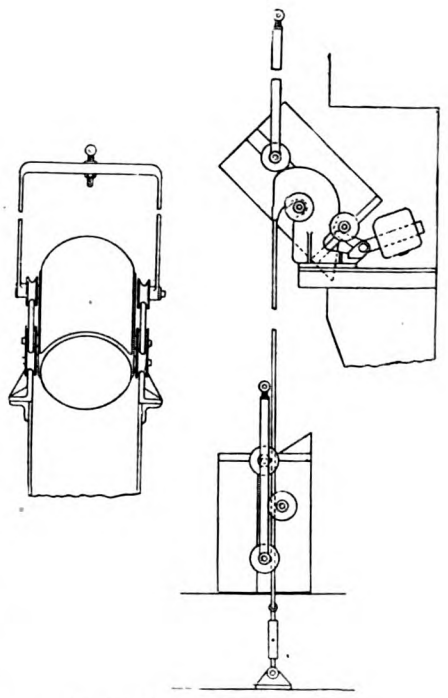
PROBABLY THE FIRST ENGINE TELEGRAPH EVER INSTALLED ON A STEAMER.

Detroit Ship Building Co. had an attractive exhibit, including a steam steerer, metallic life boats and rafts and a wide range of ship fittings and marine hardware. An interesting feature of this exhibit was the engine room telegraph used on the famous Great Eastern in 1865, when that ship was engaged in cable laying. This telegraph was probably one of the first examples of mechanical communication between bridge and engine room and bears the name of The Atmospheric Telegraph Co., London, as maker. The Great Lakes Engineering Works had on exhibition a model of the car ferry Ashtabula, built by that company for Lake Erie trade in 1905, and also a model of the steamer Wm. P. Palmer, one of three which the company has on contract for the Pittsburg Steamship Co., the lake end of the United States Steel Corporation. Boh models are built on a scale of ¼ in. per foot, and are handsome pieces of work. The Palmer, as has been already announced, is being built on what is known as the Isherwood system of longitudinal framing and is the first to be built on that system for great lakes trade. The company also exhibits a 50-ton ice machine, together with a model of the new cell block system for making ice from raw water without distillation. The Vinton Co., which, as is well known, has done the interior work for a number of the best lake passenger steamers, also had an exhibit of woodwork and interior trim.

PROCTOR'S PATENT SELF-TIPPING BUCKET.

Another development in the patent silent ash hoist, associated with the name of W. E. Proctor, of the firm of Messrs. F. J. Trewent & Proctor, naval architects and consulting engineers, of Billiter street, London, is a patent self-tipping bucket, as here illustrated.

This type of bucket is the outcome of a series of experiments to obtain the best and least complicated arrangement, and is not only practically noiseless, but



Proctor's Patent Self-tipping Bucket

very simple, the working parts consisting only of guide rollers or pulleys, which cannot get out of order. One man can fill the bucket and work the hoist from the stokehold floor level. The illustration is almost self-explanatory. There are three cast steel brass-brushed guide wheels on each side of the bucket, and two wire rope guides, which pass between the wheels, as shown, the top end of each guide being attached to a thin cast steel plate or header. When the bucket is lifted, the middle wheel runs into the slot shown, while the top wheels run round the periphery of the header, and cause the bucket to tilt. The levers and weights are provided in case the vessel has a heavy list, in which case, the levers give the bucket a push back again to the vertical position. It also has the advantage of bringing the bucket quietly to rest. The only fitting necessary, beyond fastening the wire ropes at the bottom end and as attachment for the pulleys, is a couple of angle bars on each side of the shoot on which the headers can be fastened, as shown in the diagram. This arrangement of self-tipping bucket can be supplied separately for working in conjunction with other types of hoist if desired.

Duluth, Missabe and Northern Railway's Coal Dock

THE United States Steel Corporation is steadily developing its physical equipment for the economical handling of its raw material and products of manufacture. Being blessed with abundant resources it does not falter at the expenditures of large sums to achieve any desired end. The new coal dock of the Duluth, Missabe & Northern Railway, Duluth, is a case in point.

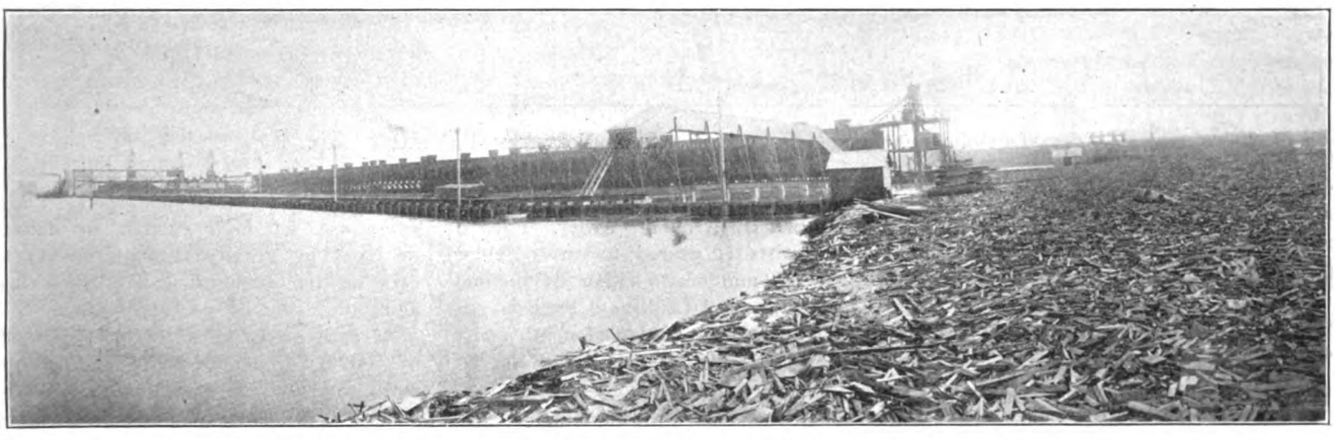
This dock was built to care for the fuel requirements of the Duluth, Missabe & Northern Railway and of the numerous iron ore mines contributory to the railways. The dock is 2,000 ft. long and 604 ft. wide, situated on St. Louis Bay contiguous to the ore docks. It is one of the most complete structures of its kind in existence. Its fire fighting equipment is especially complete. Much thought has been given to this feature as the dock is somewhat isolated. A fireproof pump house is placed about midway on the outer end of the dock containing an 8-in. Aldrich triplet pump geared to a 75-H. P. motor. The pump draws water from the bay and discharges from a 6-in. main extending the full length of the dock, hydrants being placed at intervals and hose reels being kept in convenient places ready for immediate service. In addition the fire boat McGonagle, stationed at the ore docks adjacent, is available.

The dock is built upon a reclaimed area and extends from the shore line to within 150 ft. of the 300-ft. channel maintained by the Federal government. This channel provides 26 ft. of water and the intervening space between it and the outer end of the dock has been dredged to a similar depth, thus securing a waterway 450 ft. wide. The equipment is so arranged that coal is unloaded from vessels moored at the end of the dock. The coal handling machinery, designed and erected by the Mead-Morrison Mfg. Co., of Cambridge, Mass., consists of the following units: Three one-man steel counterbalanced hoisting towers traveling along the end of the dock; a cable railway system which delivers coal from these towers to storage or to elevated pockets; a double pick-up steel bridge that reclaims coal from storage to the cable railway system and pockets; a railroad car haulage system and belt conveyors for handling screenings from the pockets. All of this equipment is electrically operated by General Electric motors.

The three counterbalanced steel towers travel along the end of the dock on a steel trestle 450 ft. long and 35 ft. high above the level of the dock. They are equipped with a two-ton capacity Rawson grab bucket operated on a 53-ft. boom swung out over the water from the tower. The boom is pivoted on a universal joint at the point of its support at the inner end, permitting it to be swung through a horizontal angle of 180 degrees. This arrangement enables the boom to clear the mast of vessels at the end of the dock. The towers hoist the coal about 80 ft. from the vessel and as they are self-propelling they can accommodate their position readily to the different hatches of the vessel. The bucket delivers to a hopper in the tower and from this hopper four-ton cars of the cable railway system are supplied automatically.

The cable railway system has a loop on the trestle at the end of the dock. The ends of this loop are connected on the shore side of the trestle with two tracks on a second trestle extending the full length of the dock along its center line. At the shore end of this long trestle the tracks also are connected by a loop, thus forming a continuous circuit over which the four-ton cars are operated. The pick-up bridge covers the storage space of one side of the trestle on the center line of the dock. The track on the adjacent side of that trestle is arranged so that cars may be diverted from it and sent around a loop which extends to the outer end of the bridge and back to the trestle again.

The hopper in each of the hoisting towers to which the respective grab bucket delivers coal is equipped with a car loader, by means of which the cars are filled without stopping, obviating the necessity of an attendant at that point.

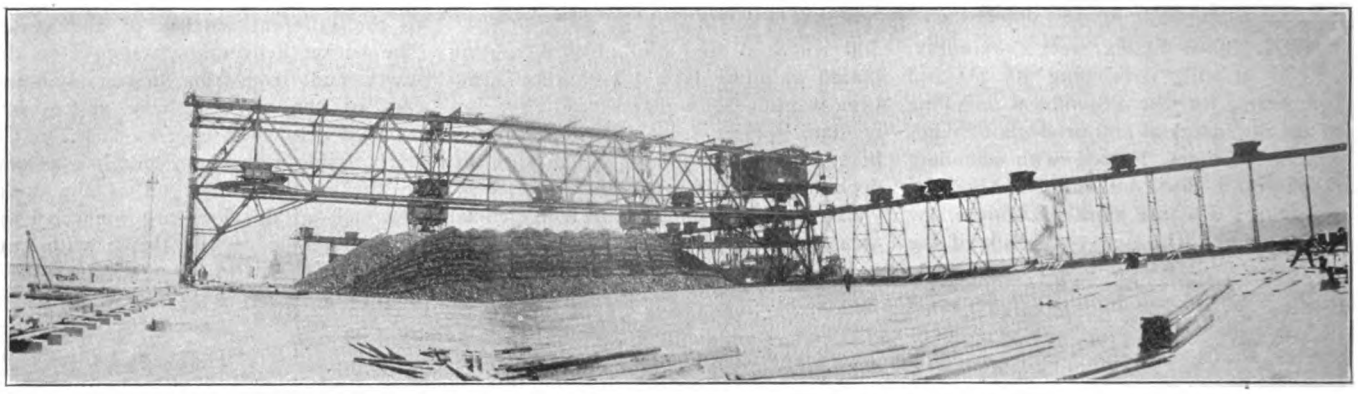


THE DULUTH, MISSABE & NORTHERN RAILWAY'S COAL DOCK AT DULUTH.

The hopper has a motor-driven gate through which coal is fed to a pan and the latter is tripped automatically to discharge its contents into each passing car. When the pan is full, the gate motor is also stopped automatically, provision being made to prevent the pan from spilling coal when no car is under it. The four-ton cars are hauled on the trestle by a continuous cable, each of them being equipped with a swivel cable grip which is arranged with a grip that releases the cable automatically at points desired. The cars have side doors which are unlatched automatically by a tripper placed at any point along the track where the coal is to be discharged. The cable travels at the uniform rate of 300 ft. per minute.

The first 800 ft. of the trestle on the center line of the dock is a steel structure carrying two tracks of the cable railway system at a height of 35 ft. above the surface of the storage space. For the remaining 1,200 ft. of its length this trestle has timber bents supporting continuous storage pockets under the tracks of the cable railway. The pick-up bridge travels along one side of the trestle with one end overhanging the latter and spans the storage space on that side of the dock. The bridge consists of a pair of trusses spaced 21 ft. apart and carried at each end on a two-leg tower. The towers are mounted at the base on wheels traveling on rails laid the length of the storage space, these rails being 262.5 ft. apart on centers. The lower chords of the trusses are placed so coal can be piled to a height of 32 ft. across the storage space and the bridge has a travel of 1,700 ft. The single track loop of the cable railway that is carried by the bridge is laid on floor beams between the lower chords of the trusses. When the cars approaching from the outer end of the dock are to be shunted over the bridge, the tripper is set to release the cable grip just before the bridge is reached. The cars thus retain sufficient momentum to mount the turn-out and continue a short distance along the bridge. A chain haulage driven by a 500 H. P. motor in a cabin on the end of the bridge is provided to move the cars on the bridge. This chain engages the grip on the truck of the car and pulls the latter around the loop until a connection to the trestle track is reached. At this point the haulage chain releases automatically and the grip is attached to the cable by a man on the trestle. Cars can be supplied automatically at any point in their travel along the bridge by means of a tripper which unlatches their doors. The bridge is equipped with two-ton drag line scoop buckets, one of which is placed on each side of it. Each of these buckets is suspended from a trolley carriage operating on a runway carried on arms cantilevered beyond the top chord of the adjacent truss. The bucket is hauled back and forth along the runway and raised and lowered by a double drum hoist in a cabin on the tower. Each of these hoists is geared to an individual 150-H. P. motor and either of the motors can be used to drive a traction gear that traverses the bridge along the dock. A hopper is placed at the end of each bucket runway directly over the track of the cable railway system on the bridge side of the trestle. The buckets discharge the coal into the respective hoppers and it is fed from the hopper to the cars for delivery to the row of elevated pockets. The arrangement of the tower equipment is, therefore, such that coal can be unloaded from the vessels, delivered to storage and reclaimed later or it can be handled directly to the row of pockets for immediate shipment. Obviously the greater percentage of coal goes into storage to meet the demand for coal during the winter.

The cars thus follow in continuous operation from the hoisting towers around the loop to the long trestle, thence are diverted over the pick-up bridge to discharge their loads and return to the trestle to continue to the end of the latter, from which they come back on the second track to the hoisting towers. When coal is being reclaimed, the cars do not pass over the bridge, but are halted long enough on one of the hoppers on the end of the latter to receive a load. During the direct transfer of coal from vessels to the row of pockets the cars do not pass over the loop on the pick-up bridge. The row of pockets are placed high enough to discharge by gravity into railway cars on a track at the dock level that parallels closely the trestle. The bottoms of the pockets are built on a slope toward discharge openings at the side on which the railroad track is placed. The openings are spaced 12 ft. apart and between them the pockets are divided transversely by tight partition walls. Each of the 83 pockets has a capacity of 35 tons, making a combined capacity of 7,055 tons. The discharge openings are each controlled by a gate operated by hand from a walk at the ground level. These gates are set high enough to deliver the coal by gravity through spouts to cars on the standard gauge track laid along the row of pockets.



PICK-UP BRIDGE OF THE DULUTH, MISSABE & NORTHERN RAILWAY'S COAL DOCK.

At each discharge gate for a distance of 500 ft. from the shore end of the row provision is made to screen the coal by passing it over a grizzly. The screenings drop on a 24-in. conveyor belt which delivers them at the end to a bucket elevation. The latter discharges them in turn into a hopper with two chutes leading from it, one to the top of the end of the trestle and the other to a conveyor extending across the storage space served by the pick-up bridge. Cars on the cable railway system can be supplied from the first chute and the screenings thus delivered back to the pockets for shipment. The cross conveyor to which the second chute delivers is placed on a trestle and is arranged so that the screenings may be discharged from it at any point in the width of the storage space. The trestle carrying this belt is built to permit the pick-up bridge to clear it and reclaim the screenings from these piles to the cars of the cable railway for delivery to the storage pockets the same as other coal.

The car haulage system has been provided to shift cars on the two standard gauge tracks on the axis of the dock. The necessity of maintaining a switching engine on the latter is thus avoided, minimizing the fire risk. The cable of the haulage system extends the full length of one track from a hoist in a house at the outer end of the dock to a sheave at the shore end of the pockets and then back along the other track to the hoist again.

A recording scale installed on the dock enables a record to be obtained of each car of coal shipped.

Power is derived from the Great Northern Power Co., of Duluth. The dock was designed by H. L. Dresser, chief engineer of the Duluth, Missabe & Northern Railway, and the dock was built by the Barnett & Record Co., of Minneapolis, Minn.

The Progress of Warship Engineering

TO THE 1909 edition of "Fighting Ships" a careful analysis of warship engineering during the past year is once again contributed by C. de Grave Sells, M. Inst. C. E. Prominence in this survey is naturally given to turbine machinery, a good deal of attention being bestowed upon the comparative trials of the United States cruisers Birmingham, Chester, and Salem, dealt with already at some length in these columns. At the outset Mr. de Grave Sells remarks that during the past 12 months a greater readiness has been shown on the part of the authorities of the other navies of the world to follow the example of the British navy in the adoption of turbine engines for the propulsion of their ships, but the principal feature of the year has been the acceptance of other types of turbines for ship propulsion besides the two generally recognized as having proved themselves suitable for marine service. The Parsons type, however, is still well ahead of all others, but the adoption of the Curtis type for a British cruiser and the assumption of the license to manufacture by Messrs. John Brown & Co. of Clydebank, combined with the excellent results obtained with the Salem have given this type a very considerable increase in favor.

The Internal Combustion Engine and the Use of Gasoline.

In the course of a note on internal combustion engines the author remarks that most navies have now some few craft fitted with these engines, but the general adoption of such engines for naval purposes has been greatly retarded by the greater attention given by designers and constructors to gasoline and paraffine motors, rather than to the development of engines using mazout, which is generally considered to be the only fuel permissible for naval purposes.

This point has been emphasized on several occasions recently by small mishaps, but the disaster on the Italian submarine Foca, which resulted in considerable loss of life, should determine once for all the entire abolition of such substances from vessels of war and especially so for use as fuel. It is well to again insist on the point that in a war vessel the one thing to provide for is to render her as perfect and as serviceable as possible for use in war, otherwise there is but little reason for her existence. It is certainly possible to run boats with gasoline in comparative safety so long as their compartments are freely open to the outer air, but in a war vessel, with its sundry compartments and difficult ventilation, the oversight of a small leak may lead to an accumulation of inflammable and explosive vapor which may even in peace time, have dire and fatal effects.

The use of gasoline must be absolutely dispensed with, and, whilst paraffine is much safer and less objectionable for war ships, still even this has its dangers, and it is well to adopt mazout, which is the only absolutely safe fuel for such purposes.

Marine Suction Gas Plant in Operation.

The author includes an interesting description of the suction gas engines and Capetaine producer-plant in use on board the gun-boat Rattler. He mentions that since her transformation the Rattler has run about 2,000 miles at an average speed of 8 to 9 knots. The fuel used has been Scotch anthracite, costing 15s 6d per ton, and it is found that the consumption is about 50 per cent of that originally consumed of best Welsh coal to obtain the same result. The machinery is found very handy for getting under weigh. From taking charge the vessel can be started in 30 minutes, and, when the engines are finished with, 10 minutes is sufficient for the engine staff to leave everything in good order. In space and weight the new installation saves about 25 to 30 per cent as compared with steam machinery, and whereas as a steamship the engine-room and stokehold complement consisted of four engineers and 13 stokers, she now requires only three engineers and four producer attendants. But the work of these latter is very different indeed to what was required of the stokers, as the charging of the producer is much simpler work, and requires to be carried out once only in every two hours.

The undoubted advantages of the system over steam machinery for such an installation will probably lead to its being adopted for small vessels for harbor use and vessels having a regular service from a fixed base, but there seems no probability of its extensively displacing steam machinery under ordinary conditions.

The Status of Engineer Officers.

Mr. de Grave Sells devotes some space also to the question of the status of engineer officers, and gives a careful summary of the reforms which the engineer officers of the British navy, in their recent statement of disabilities, have set forth as being necessary.

Concluding this part of his review, Mr. de Grave Sells says that "the world in general has come to realize that thorough efficiency in any special branch can only be realized by special devotion to that branch, and this is truer in engineering matters than in any others. In this special line, too, the extent of the knowledge required covers a very large area, for the complex mass of machinery due to human ingenuity contained within the hull of a warship is no small matter, and each particular portion has its special needs, for which practical experience of those needs is required. So that to be a *real* engineer, the officer must give all his time and all his thoughts to his profession, and it is folly to suppose that he can attain to the required grade of perfection if the larger portion of his time is given to such entirely alien matters as those appertaining to many of the duties of the executive officer. To continue in this direction is to court disaster, for in time of peace. It must be realized assuredly be found wanting, however well they may have been bolstered up by their more experienced subordinates in time of peace. It must be realised that the result of the battle will absolutely depend as much on the machinery and the engineer staff as it does on the guns and the men behind them. The engineer officers of the past and present have always responded splendidly to what was required of them, and it should be the aim of all concerned to render the engineer officers of the future as near perfection as possible, and this can only be done by

a full recognition of the fact that they must be *real* engineers, and *engineers only:*

Among other subjects dealt with are turbine lifting gear; Prof. Weighton's air gage; the combination system of reciprocating engines and turbines, as developed on the steamship Otaki; torsion meters; a new arrangement of Belville boiler; a new type of firing indicator introduced in the French navy; patent fuel; liquid fuel; engine room telegraphs; gun elevating gear; and the cruise of the United States battleship fleet.

Accidents of a Month

ACCIDENTS during June were neither numerous nor costly. Had it not been for the stranding of the L. C. Smith near Two Harbors, on June 23, the financial loss would have been small. The Smith, however, is badly damaged and it will cost about $30,000 to repair her.

Probably the most surprising accident was the stranding of the steamer L. C. Hanna on the outer rocks off Kettle Point, being fully 25 miles out of her course. A thick pall of smoke overhung the lower end of Lake Huron and delayed many vessels. The Hanna was released after 4,000 tons of her cargo of iron ore had been lightered. Forest fires, which have been raging in the upper region, have hindered navigators not a little. Little attention has been paid to this feature in the newspapers, but the smoke really covers a more extended area than is generally appreciated. The fact that accidents were so few is both creditable and encouraging. Certainly masters have had it hammered into them by their owners that dispatch is a second consideration to safety: Following is the list:

DATE.	NAME OF VESSEL.	NATURE OF ACCIDENT.	PLACE.
June 10	Str. A. L. Hopkins.....	Collided with str. Syracuse; badly damaged on port side; number of seams opened; machinery was dislocated.....	Near Southeast Shoal, Lake Erie.
June 10	Str. Syracuse.....	Collided with str. A. L. Hopkins; not damaged.....	Near Southeast Shoal, Lake Erie.
June 10	Str. Raleigh.....	Collided with str. Selwyn Eddy and ran on bank; released on 11th; in dry dock at Cleveland one week, to make repairs.....	Near Russell Island, Lake St. Clair.
June 10	Str. F. B. Wells.....	Collided with str. John A. Donaldson.....	Lake St. Clair.
June 10	Str. Jno. A. Donaldson.....	Collided with str. F. B. Wells.....	Lake St. Clair.
June 18	Str. Frontenac.....	Hit by str. Eastland on starboard side; one plate cracked.....	Cleveland.
June 23	Str. L. C. Smith.....	Stranded in dense fog on rock; released on 26th; No. 1 compartment badly punctured; hole 20 ft. long in side, and bottom badly damaged; docked at Toledo; repairs estimated at $30,000..	Near Two Harbors, Lake Superior.
June 29	Bge. Pennington.....	Struck pier, the jar throwing one man overboard and drowning him	Foot of Weitzel Lock, Soo River.
June 29	Str. E. J. Earling.....	Collided with str. Omaha; slightly damaged.....	St. Clair River.
June 29	Str. Omaha.....	Collided with str. Earling; slightly damaged.....	St. Clair River.
June 30	Str. W. B. Schiller.....	Ran aground, owing to heavy smoke from forest fires; released, uninjured	Round Island, St. Mary's River.
June 30	Str. W. B. Eads.....	Ran aground, owing to heavy smoke; released after lightering 200 tons; docked at Cleveland; six plates damaged.....	Round Island, St. Mary's River.
June 30	Str. Lagonda.....	Ran aground in heavy smoke; released, uninjured.....	St. Mary's River.
June 30	Str. Uganda.....	Hole punched in starboard bow.....	Cleveland Harbor entrance.
July 1	Str. D. Leuty.....	Ran ashore.....	Bacon Island.
July 1	Bge. B. W. Jenness.....	Collided with str. F. B. Squire; bad hole in port bow.....	Detroit River, near Grosse Isle.
July 1	Str. F. B. Squire.....	Collided with bge. Jenness.....	Detroit River, near Grosse Isle.
July 2	Str. La Belle.....	Stranded in thick weather; lightered 1,600 tons of ore and was released July 3, uninjured.....	Hay Lake.
July 4	Str. John A. Donaldson.....	Ran ashore, owing to disabled steering gear; wheel chains parted; driven on shore; released July 6 after lightering 2,500 tons.....	Little Rapids Cut, near Soo.
July 4	Str. Black Rock.....	Ran ashore; released July 5 after lightering	Near Hammond's Bay, Lake Huron.
July 5	Str. L. C. Hanna.....	Ran ashore; Nos. 2 and 3 compartments full of water; bottom forward badly torn; released on 6th after lightering 4,000 tons of ore; will be docked at Lorain or Cleveland.....	Kettle Point, Lake Huron.

LAKE TRADE DURING JUNE.

June on the lakes has been a most unusual month. It was early apparent that there was not sufficient work for all of the ships and the independent vessel owners voluntarily tied up one-fifth of their tonnage. During the month 38 vessels went into ordinary, notwithstanding which the ore movement was the heaviest on record. In fact, heavy as it was it did not keep the active fleet busy, there being continually more ships than cargoes. The lesson is obvious. There are more ships on the lakes than are needed. Two things have contributed to bring this condition about—the first, the rapid increase in the size of ships with the consequent increase in average cargo; the second, the rapid and astonishing development of the unloading machine, making possible the discharge of a 10,000-ton cargo in a working day of ten hours. This indeed has been a common occurrence and has made it possible for the favored ship to make an extra trip or two during the season.

The inevitable consequence of this evolution will be a cessation of ship building for independent interests. The lakes are not likely to see for some time to come the promotion of independent companies for the construction of bulk freighters such as has marked the business for the past few years. Whatever contracts are let will come from producing and consuming interests such as the steel-making companies. Even with 20 per cent of the ships laid up, the fleet is having no difficulty in moving the product and it cannot now be predicted when business will be forthcoming for the 20 per cent now in ordinary. The June movement of ore was very heavy, over 7,000,000 tons, which may be fairly said to approximate the maximum for the remaining summer months.

Another interesting feature of the month was the suit of the government to dissolve the Great Lakes Towing Co. as a trust. In the government's petition the Towing company was charged with stock ownership and other control of various towing and wrecking companies, alleging that some of them are represented as independent concerns. The effect, according to the government petition, has been discrimination in rates by which favored vessels are handled at low prices while owners of other vessels are required to pay excessive charges. Injunctions to wind up the business are asked for the following companies: Great Lakes Towing Co., Dunham Towing & Wrecking Co., Thompson Towing & Wrecking Association, Hand & Johnson Tug Line and Union Towing & Wrecking Co. The government demands restoration of the old towing and wrecking companies to their former positions as independent concerns.

An irritating feature was the brief strike of the licensed tugmen at Cleveland and Ashtabula for a shorter working day. This was in defiance of a two-year agreement which had been entered into last spring with the towing

company. The tugs in both harbors were idle for a few days when the men were persuaded to return to work under the terms of their original contract.

COMMERCE OF LAKE SUPERIOR.

The commerce of Lake Superior as measured by the canals at Sault Ste. Marie during June was 9,839,872 tons. The Canadian canal is still carrying the greater portion of this commerce owing to more favorable draught. The commerce to July 1 totals 20,327,071 tons against 12,117,367 tons for the corresponding period during 1909, showing the substantial increase of 8,209,704 tons. Following is the summary:

	To July 1, 1909.	To July 1, 1910.
EAST BOUND.		
Copper, net tons	34,731	39,610
Grain, bushels	9,182,563	16,002,846
Building stone, net tons	880	500
Flour, barrels	1,691,948	2,085,397
Iron ore, net tons	8,073,482	14,111,808
Pig iron, net tons	7,290	5,691
Lumber, M. ft. b. m.	146,245	185,693
Wheat, bushels	19,002,817	23,596,451
Unclassified freight, net tons	48,149	36,301
Passengers, number	4,767	5,250
WEST BOUND.		
Coal, anthracite, net tons	448,397	642,670
Coal, bituminous, net tons	1,893,135	3,350,029
Flour, barrels	1,320	1,000
Grain, bushels	500	2,100
M'f'c't'd iron, net tons.	120,835	162,560
Iron ore, net tons	3,474	.....
Salt, barrels	243,379	276,335
Unclassified freight, net tons	280,381	403,337
Passengers, number	4,820	6,732
SUMMARY OF TOTAL MOVEMENT.		
East bound, tons	9,334,789	15,727,533
West bound, tons	2,782,578	4,599,538
Total	12,117,367	20,327,071
Vessel passages	4,480	6,715
Registered tonnage, net.	9,938,707	16,978,402

LAKE SHIP BUILDING.

The bulk freighter W. J. Olcott, building at the Ecorse yard of the Great Lakes Engineering Works, for the Pittsburg Steamship Co., was launched on Saturday, July 9. This is the first of the three steamers building for this steamship company to be launched. The Olcott is 600 ft. over all, 580 ft. keel, 58-ft. beam and 32 ft. deep.

The tug E. P. Dempsey was launched from the Cleveland yard of the American Ship Building Co. for the Kelley Island Lime & Transport Co., June 2. The Dempsey is 87 ft. over all, 77 ft. keel, 20 ft. beam, and 10½ ft. deep.

The bulk freighter Theodore H. Wickwire Jr., building for Boland & Cornelius, of Buffalo, was launched from the St. Clair yard of the Great Lakes Engineering Works on July 25.

Four tugs were launched on June 11 at the Lorain yard of the American Ship Building Co. for the Booth Fisheries Co. The tugs are named Cincinnati, Louisville, Nashville, and Chattanooga and are duplicates, being 70 ft. long, 18 ft. beam, and 15 ft. deep.

The steamer Moreland, building at the Lorain yard of the American Ship Building Co. for Jones & Laughlin, of Pittsburg, will be launched on June 16.

The Ann Arbor Railroad Co. has given contract to the Toledo Ship Building Co. for a car ferry to be 330 ft. keel, 56 ft. beam and 21 ft. deep.

ORE SHIPMENTS DURING JUNE.

Ore shipments during June were 7,316,592 tons, an increase of 1,923,337 tons during June 1909, when 5,393,255 tons were moved. This brings the total shipments to July 1 to 14,918,258 tons, an increase of 6,215,935 tons over the 1909 movement. It will be recalled that over 42,500,000 tons were moved during 1909, so that the 1910 movement is likely to exceed the predicted 50,000,000 tons. Following are the shipments arranged by ports:

Port.	June, 1909.	June, 1910.
Escanaba	747,377	767,618
Marquette	287,127	533,358
Ashland	371,169	708,248
Superior	856,062	1,321,877
Duluth	1,968,800	2,567,077
Two Harbors	1,162,720	1,418,414
Total	5,393,255	7,316,592
1910 increase		1,923,337

	To July 1, 1909.	To July 1, 1910.
Escanaba	1,132,233	1,739,735
Marquette	420,224	1,150,244
Ashland	612,024	1,515,555
Superior	1,464,577	2,632,835
Duluth	3,184,725	5,097,262
Two Harbors	1,888,540	2,782,627
Total	8,702,323	14,918,258
1910 increase		6,215,935

BLUE BOOK OF AMERICAN SHIPPING.

The 1910 edition of the Blue Book of American Shipping is just off the press. This is the standard marine directory of the United States, giving particulars of all vessels on the Atlantic and Pacific seaboards, the great lakes, and leading rivers. It also gives the names and addresses of the managing owners of the vessels and is, therefore, extremely useful to all those who desire to reach this trade in the way of business. Aside from the general classification the fleets have been assembled under their individual owners so that any manufacturer, banker or merchant can readily determine the number of vessels owned by each individual or company. Lists are also published of the ship and engine builders of the United States and Canada, as well as dry dock and repair yards. There is also published a directory of naval architects and marine engineers, admiralty lawyers and ship chandlers. A compendium is also given of all the steamship lines of the United States, both foreign and domestic.

A feature of particular interest, especially for the railroads, are statistics dealing with the commerce of the great lakes, especially in relation to iron ore and coal. The Blue Book is a complete directory of the great iron mining interests of the Lake Superior country, giving lists of all operators, shippers, agents, with complete data of both shipping and receiving docks. A list is also given of all the coal docks on the great lakes.

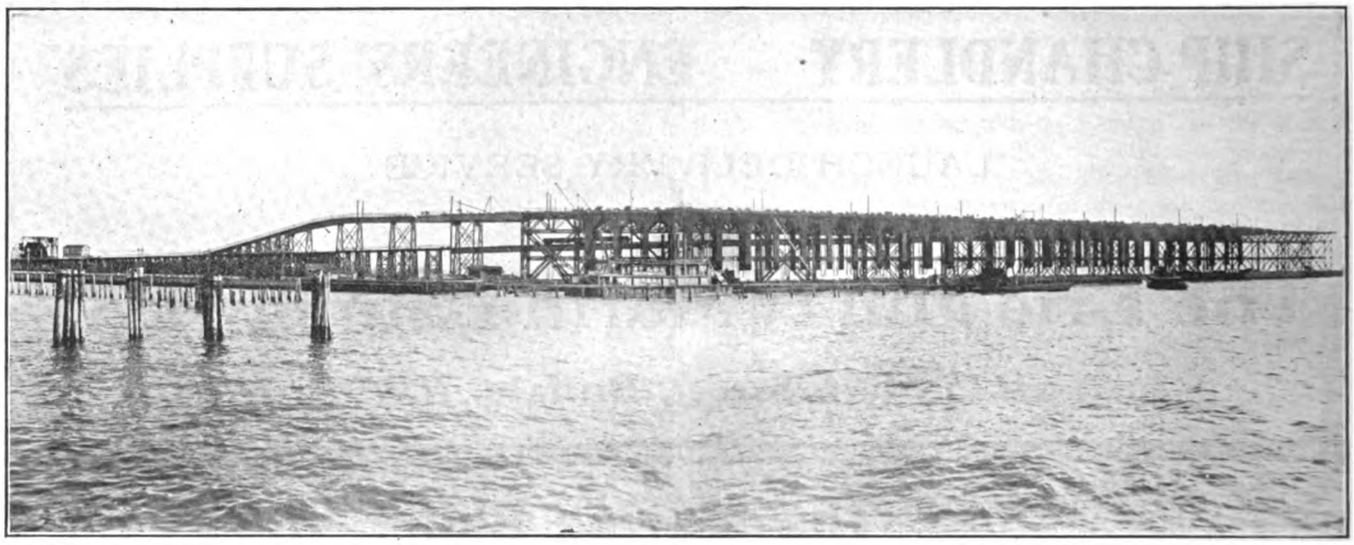
The intention has been to publish a directory that would facilitate anyone in reaching the marine and co-related trades. The Blue Book is published by the Penton Publishing Co., Cleveland, O. The price is $5, carriage prepaid anywhere on earth.

SUBMARINE SIGNALING.

Prof. Lucien I. Blake gave an interesting talk on Submarine Signaling at the Colorado Electric Club luncheon, June 23. The unreliability of air was contrasted with the reliability of water or solids as mediums for sound waves. He described the variation in distances in sunshine and darkness at which sounds of equal density can be heard, explaining about "zones of silence," "picking up sounds along the water," etc. None of these variations, he stated, affect submarine signaling. The whole difficulty was to obtain the proper transmitter making audible and clear the vibrations under water, and then to develop the water microphone, which was really the easier part of the problem. The equipment of lightships, trans-Atlantic steamers, etc., with signaling and receiving devices has made travel almost infinitely safer in fogs and storms than before. The signals are reliable at 15 miles, which is outside of the necessary distance. Both direction and distance can be determined from the character of the sound, and its intensity, and the number of strokes indicate the point on the international map. While considerably more restricted in its zone than wireless telegraphy, he considered that subaqueous signaling is at present in a much more perfected state and applied to a much more generally useful field.

ACCIDENT ON THE OHIO.

While taking south a fleet of coal boats and barges, the steamers Henry Lourey and Rover, of the Monongahela River Consolidated Coal & Coke Co., met with an accident June 8, near Lock No. 2, in the Ohio river. The Rover was sunk. Four coal boats out of a



NEW COALING PIER OF THE VIRGINIAN RAILWAY CO. AT SEWELL'S POINT, VA.

For description see Marine Review for May.

tow of eight, two barges and two flats, containing 100,000 bu. of coal also were sunk. The Lourey, which was pushing the tow, escaped damage. The Rover had been sent out as a helper to the Lourey and after passing Dam No. 2, was placed at the head of the tow. The force of the current and the Lourey coming behind caused the Rover to overturn, and the four coal boats at the head of the tow buckled and went down. The rest of the tow, breaking loose, scattered and floated down the river, grounding at various points. The crew of 14 on the Rover lost everything but the clothes they were wearing and had a narrow escape from death. The accident occurred near the point where the tow boats Tom Dodsworth and Boaz lost 16 barges of coal on June 7.

ITEMS OF INTEREST.

The naval harbor of Dover, which has been in the course of construction for eleven years and has cost about $20,000,000, was formally opened on Oct. 15 by the Prince of Wales. The harbor comprises an area of nearly 700 acres formerly embraced in the open sea.

The Navy Department has decided to equip both the Wyoming and Arkansas with Parsons turbines. It was the original intention to equip the Wyoming, to be built by Cramps, with reciprocating engines.

W. A. Hengstenberg has been appointed secretary and general manager of the Seneca Chain Co., Kent, O. and will have charge of the plants at Kent and Mansfield. Mr. Hengstenberg was until recently the vice-president of the Newhall Chain Forge & Iron Co. of New York.

The Submarine Signal Co., 88 Broad street, Boston, in its Bulletin No. 35 announced that submarine signaling apparatus has been installed on 550 vessels, which is an increase of 24 per cent since April 1. The bulletin also announces that the electric bell which was located at Point Detour light at the entrance to St. Marys river was moved Sept. 7, 1909, to a point 2,000 ft. S E by E ¼ E from its former position and now lies sextant angles Espanore Island and Frying Pan light 92° 22′, Frying Pan light and Detour light 50° 7′, Detour light and Point St. Vidal 54° 33′.

The Morning Star, operated by the San Juan Navigation Co. between Seattle and points in the San Juan islands, has been converted into a passenger boat with accommodations for about 40 persons. She was originally designed for a missionary boat with small cabins like an ocean steamship. The redesign of her decks by McAllister & Bennett, Seattle, quarters the crew below decks, adds a Texas deck with staterooms and the captain's quarters forward, and provides a number of staterooms on the main deck.

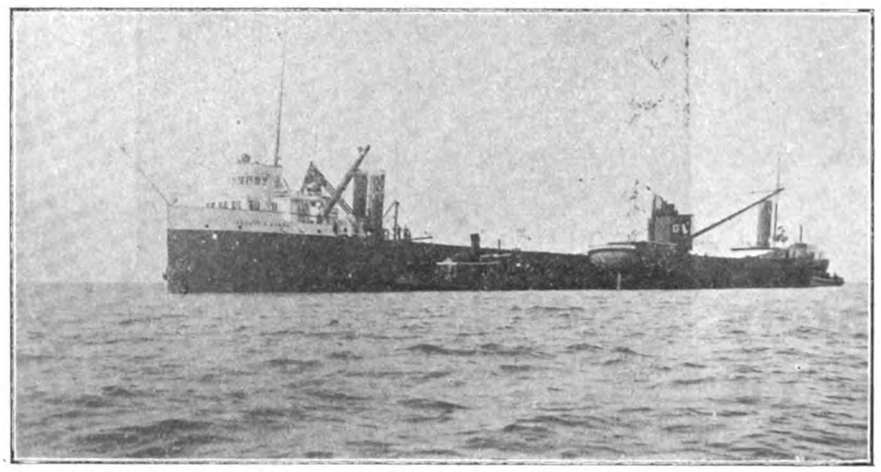
SUMMARY OF NAVAL CONSTRUCTION.

The monthly summary of naval construction, issued by the bureau of construction and repair, shows the following progress upon vessels:

Name of Vessel—	Building at—	—1910— Per Cent of Completion. May 1.	June 1.
BATTLESHIPS.			
Florida	Navy Yard, New York	63.4	66.3
Utah	New York S. B. Co	72.0	76.0
Wyoming	Wm. Cramp & Sons	19.0	22.5
Arkansas	New York S. B. Co	24.0	27.6
TORPEDO BOAT DESTROYERS.			
Paulding	Bath Iron Works	86.8	89.4
Drayton	Bath Iron Works	77.6	82.5
Roe	Newport News S. B. Co	85.1	88.7
Terry	Newport News S. B. Co	82.4	86.9
Perkins	Fore River S. B. Co	72.9	79.6
Sterrett	Fore River S. B. Co	71.4	77.1
McCall	New York S. B. Co	66.9	76.5
Burrows	New York S. B. Co	65.6	72.7
Warrington	Wm. Cramp & Sons	67.5	68.3
Mayrant	Wm. Cramp & Sons	72.6	73.9
Monaghan	Newport News S. B. Co	18.3	19.9
Trippe	Bath Iron Works	31.9	38.8
Walke	Fore River S. B. Co	27.5	32.1
Ammen	New York S. B. Co	30.9	40.4
Patterson	Wm. Cramp & Sons	17.8	23.0
SUBMARINE TORPEDO BOATS.			
Salmon	Fore River S. B. Co	92.7	94.7
Carp	Union Iron Works	47.6	53.5
Barracuda	Union Iron Works	47.6	53.5
Pickerel	The Moran Co.	46.4	50.4
Skate	The Moran Co.	46.1	50.4
Skipjack	Fore River S. B. Co	37.6	40.1
Sturgeon	Fore River S. B. Co	36 7	38.9
Thrasher	Wm. Cramp & Sons	4.7	5.7
Tuna	Newport News S. B. Co	22.2	26.2
Seal	Newport News S. B. Co	48.9	50.1
COLLIERS.			
Cyclops	Wm. Cramp & Sons	70.6	74.8
No. 8	Maryland Steel Co	23.3	28.23

STEAMER L. C. HANNA'S PLIGHT.

The steamer Leonard C. Hanna had the misfortune to run ashore on the outer edge of Kettle Point at the foot of Lake Huron during a dense fog caused by smoke, on Sunday morning, July 3. This location is about as nasty a one upon which to strand as is to be found on the chain of lakes, as the rocky ledge extends for several miles into the lake and is entirely exposed. Heavy seas would speedily do great damage to a steamer stranded there. The Hanna was released after the Favorite had jettisoned 4,000 tons of her ore cargo. She was released before the lighter Rescue reached her. The steamer's No. 1, 2, 3 and 4 tanks were filled with water and her bottom was in bad shape. Two air compressors and a pump were placed aboard her and she proceeded to Cleveland, where she unloaded the balance of her cargo. She was docked at Lorain, where it was discovered that forty bottom plates were damaged and several frames broken.



THE STEAMER L. C. HANNA ON THE ROCKS OFF KETTLE POINT, LAKE HURON, WITH THE WRECKER FAVORITE ALONGSIDE.

TRADE NOTES.

The George Stratford Oakum Co., Jersey City, N. J., has just issued a calendar, the pictorial part of which is a reproduction of an excellent photograph of the non-magnetic yacht Carnegie.

The Chicago Pneumatic Tool Co., Chicago, has just issued a bulletin descriptive of the Franklin tandem gasoline engine-driven air compressors. They are high speed compressors and are claimed to be reliable and efficient.

The British Corporation for the Survey and Registry of Shipping of Glasgow, after exhaustive tests has sanctioned the use of Thermit process for repairs to fractured stern posts, lower portions of rudder frames and damages of a similar character.

The Williamsport Gas Engine Works have reopened the plant of the Williamsport Gas Engine Co. which has been shut down during the past year, and will continue the entire line of gas and gasoline engines formerly manufactured by the old company.

The American Specialty Co., of Chicago, has recently been appointed sole export agent for the line of portable electric drilling machines manufactured by the Van Dorn Electric & Mfg. Co., Cleveland. The American Specialty Co. also has the agency for these tools in the Chicago and central western districts.

John D. McRae, Oswego, N. Y., has sent out announcements to the effect that the Morison and Fox corrugated furnaces made by Schulz Knaudt, the largest makers in the world, can now be furnished for marine and stationary purposes and are guaranteed to meet all government requirements. Inquiries concerning the furnaces are solicited.

The H. W. Johns-Manville Co., 100 William street, New York, has just issued a bulletin on pipe coverings for various purposes. Efficient pipe coverings are fuel savers, the company claiming to have made as large as an 85 per cent reduction in the fuel burned in some plants where the pipes were formerly bare, and as large as 26 per cent where pipes were already supposed to be insulated.

The Dixon Co. recently took up a belt in its mill rooms for the first time in eighteen years. For eighteen years about thirty belts in that room have been run constantly. The belts are about 25 ft. in length and 6 in. in width and have run satisfactorily for eighteen years without breakage. The belts are regularly treated with Dixon's traction belt dressing which the Dixon company claims is one of the very best leather preservatives.

A little booklet of twenty-four pages under the above title has just been gotten out by the Joseph Dixon Crucible Co. As the name indicates it deals with the use of graphite about the ship, and points out the advantages that graphite offers as a lubricant for various parts of machinery. The booklet specifically deals with the lubrication of marine engines, thrust and stern bearings. The information is specially valuable because of its definiteness, the booklet describing exactly how graphite is applied for the purposes mentioned.

A fertile source of fire in manufacturing, power and similar industrial establishments is oil—not illuminating oil, but that used for lubricating purposes. The impossibility of absolutely confining oil within any but the most exquisitely ground type of bearing results in a goodly amount of oil dripping or splashing out of the bearing and on to the floor. If the latter is of concrete, the oil saturates it, thereby weakening the mass and making the floor unsafe. If the floor is of wood, the dripping oil renders it highly inflammable. Only a spark is needed to start combustion. That fire insurance companies recognize this fact is evidenced by the higher rate charged on buildings containing oil-lubricated machinery than on buildings housing machinery lubricated with plastic lubricants, grease, for instance. The ability of grease to "stay where it is put," to use an apt phrase employed by Adam Cook's Sons, manufacturers of "Albany Grease," prevents either splashing or dripping of the lubricant. Consequently, the fire risk is considerably decreased, to say nothing of the considerably increased cleanliness secured. One of the reasons for the widespread use of "Albany Grease" is the recognition by thoughtful engineers of the freedom from fire risk that its use insures.

PROPOSALS.—SALE OF U. S. S. HORNET.—Sealed proposals will be received at the Navy Department until noon of July 12, 1910, at which time and place they will be opened for the purchase of the U. S. S. Hornet, which may be examined at any time after the date hereof by applying to the Commandant, Navy Yard, Norfolk, Va. The vessel will be sold for cash to the highest bidder regardless of its appraised value, which is $7,000. Prospective bidders should apply to the Navy Department for forms of bids and bonds, together with terms and conditions of sale; also a printed list giving general information to bidders. The Department reserves the right to withdraw the vessel from sale and to reject any or all bids. Beekman Winthrop, Assistant Secretary of the Navy.